

## MILITARY MEDICINE

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## ORIGINAL ARTICLES

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## Fungus Cerebri as a Complication of Missile Wounds of the Brain\*

Some Comments on Its History and Pathogenesis with Report of Case

By

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CEREBRAL fungus has been recognized for almost two thousand years as a striking complication of compound comminuted fracture of the skull with indriven fragments of bone. The resulting protrusion of brain tissue has long been designated as a *fungus cerebri*. It has been observed most commonly as a consequence of craniocerebral wounds of warfare because under such circumstances the necessary requisites for the development of such lesions are most characteristically found—a penetrating wound of the brain with indriven foreign material which results in infection and subsequent herniation of cerebral tissue. In the past, fungus cerebri has constituted one of the most feared of all complications of such wounds, one which had its genesis in the frequent presence of secondary infection within the cerebral tissues. That such eventualities may still occur in spite of current use of antibiotics is exemplified in the case herein reported.

Because of its continued medical interest to military surgeons in all branches of the service, and because of an understanding of certain factors in its pathogenesis, it has seemed worthwhile to report an unusual

example of fungus cerebri which has come under observation at the Armed Forces Institute of Pathology. A brief historical introduction to this lesion will first be made.

## MILITARY HISTORY OF FUNGUS CEREBRI

The gross comminuted and depressed fractures of the skull, as well as the more characteristic penetrating wounds, constitute an important group of craniocerebral lesions incident to armed conflict. The lack of cleanliness inherent in field conditions, the production of large cranial defects by flying metallic fragments, the secondary infection from indriven foreign material and lack of proper debridement of such wounds in the past have all conspired to the production of cerebral fungus under these conditions. In the remote past, of course, it cannot be ascertained just how frequently this lesion developed, but the description of the gross cranial wounds in ancient Egypt as depicted in the Edwin Smith Surgical Papyrus (Breasted, 1930), and in early Greece and Rome as suggested in *The Iliad* and *The Aeneid* indicates that the requisite factors were often present. This is also true in pre-Columbian Peru as suggested by the gross cranial post-traumatic defects in extant skulls (Courville and Abbott, 1942).

The earliest specific references to fungus

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cerebri, however, do not indicate whether the lesions in question were incident to war wounds or not. Archigenes (*fl.* second century A. D. [Adams, 1849]) is credited as being the first to delineate this lesion clearly under the term *hypersarcosis*. His recommended treatment was to excise the fungus down to the level of the dura mater. Celsus (first century A. D.), who undoubtedly saw some service with the Roman armies, was also acquainted with this lesion. He advocated a more conservative regimen, however, in the form of applications of goose-grease and a vine-leaf plaster with subsequent use of corroding applications to remove decadent tissues. This seemed to be the practice of Heliodorus, a contemporary of Celsus. The specific designation of fungus was first applied by Galen (second century), and this particular lesion has thus been designated to our own times.

Nothing more is known of the history of cerebral fungus until over a thousand years later when a more complete description of this lesion was afforded through the writing of Roland of Parma (1170-1264). Just how adequately Roland's treatment of this lesion by pressure represents contemporary practice is uncertain. Certainly no great contributions to the problem were made in the next four hundred years until the time of Paré (1561), Fabry (1598) and Pigray (1666), none of whom could think of anything better to do. One of the cases of Paré concerned a soldier who had been injured in the battle of Metz; he was fortunate enough to survive his fungus. By this time, gunshot wounds of the head had come to complicate the problem of head wounds, and no doubt many of the craniocerebral injuries leading to the formation of this lesion were those sustained in battle.

It would be getting too far afield to mention all of the individual contributions which dealt with the subject of *fungus cerebri* in the sixteenth and seventeenth centuries. This has been done elsewhere (Richland and Courville, 1951) in some detail. It is advisable, however, to point out that by the time

Louis (1774) wrote his well known essay on "tumeurs fongueuses" of the dura mater, these lesions were by no means uncommon, although not always clearly distinguished from tumors of the skull and dura. It is also significant that the clearest understanding of the true character of this lesion has come from the military surgeons of the nineteenth century. Charles Bell (1807) published one of the earliest illustrations of the lesion itself, showing the gangrenous character of the herniated portion of the brain. Abernethy (1810) also wrote at length on the problem, although his experience was gained from injuries in civilian life.\* It was John Hennen (1830), with the British armies, and Larrey (1832), with the French, who began to investigate some of the basic factors underlying the development of the lesion. Demme (1861), who served with the German forces in Italy, Guthrie (1862) with his experience in the Crimea, and Hamilton (1865) on the basis of his observations in the American Civil War, all made notable contributions to the problem. These contributions led to a correct evaluation of the mechanism of the evolution of cerebral fungus, but this matter must await consideration in a later section.

A brief description of a present day experience with a cerebral fungus consequent to a war wound of the brain will serve as a text for a discussion of the pathogenesis of the lesion.

#### REPORT OF CASE

*Midsagittal craniocerebral wound by shell fragment sustained by young adult white soldier while in action in Korea. Admitted to evacuation hospital in coma with herniation of tissue arising in both cerebral hemispheres. Craniectomy with debridement of wound and removal of indriven bone fragments. Development of temporary cerebro-*

\* Two early American contributions to the subject of *fungus cerebri* are by Allan (1819) and Heustis (1829), although nothing of particular importance as far as the pathogenesis or pathology of the lesion was concerned.

*spinal fluid leak. Roentgenographic demonstration of metallic fragment in region of left tentorium. Development of typical cerebral fungus. Surgical drainage of abscess in left temporal lobe. Progressive downhill course to death 87 days after injury. Autopsy. Gross cerebral fungus with multiple abscesses of the brain.*

(Armed Forces Institute of Pathology Accession No. 551730.) A young soldier of the United Nations Forces in Korea was wounded in action on 31 October 1951, when struck in the vertex of the head by a shell fragment. The resulting tangential wound involved the loss of a considerable portion of the skull cap and much of the upper portion of both cerebral hemispheres. He was given first aid treatment in the field and was admitted on the following day in deep coma to the 121st Evacuation Hospital.

On examination it was found that the patient failed to respond to painful stimuli. The pulse was 92 and the respirations 48 per minute; the temperature was 104°F. The pupils were dilated and fixed. All extremities were completely flaccid and areflexic. The cranial wound was widely open, the damaged cerebral tissues herniating through the cranial defect.

Because of his critical condition, the patient was treated conservatively with whole blood and antibiotics. The gross wound was treated as a cerebral fungus. On 12 November 1951, a bifrontal and biparietal craniectomy was done with debridement of the midline wound of the scalp and removal of margins of the bony defect in the frontal and parietal regions. The regional dura in the posterior portion of the wound was found to be torn to shreds. The superior sagittal sinus in this region had been lacerated and 3 cm. of this channel was missing. The upper and posterior portions of both frontal lobes and the upper portions of both parietal lobes were found to be destroyed, exposing the lateral ventricles. These cavities could be directly visualized as could also the third ventricle because of the absence of the anterior two-thirds of the corpus callosum. A frag-

ment of bone lodged in the left side of the tentorium was removed but little else could be done than a debridement of necrotic tissue.

Although the patient ran an afebrile course, efforts at plastic repair had to be made piecemeal because of the patient's critical condition. On 17 November, a graft from the fascia lata was sutured into the dural defect.

Two weeks later (30 November) it was noted that a scalp infection had developed, although no signs of meningitis appeared. On 10 December a persistent leakage of cerebrospinal fluid from the posterior part of the wound was reported. Meanwhile, the patient had been able to sit up for an hour or two each day and some voluntary movements in the muscles of the right hand and the peri-oral muscles had been observed. He was evacuated to the Tokyo Army Hospital on 2 January 1952.

On arrival at this hospital, the patient proved to be unresponsive, but facial movements, lip smacking and voluntary flexor movements of the right arm and hand were noted. He was very emaciated. The area of the cranial defect was protuberant but not particularly tense; no pulsation was apparent. A linear midline scar extended from the hairline anteriorly to a point corresponding to the external auditory meatus. In the anterior third of this scar, a mass of granulation tissue developed at a point where the margins of the original suture line had separated. No leakage of cerebrospinal fluid was seen, however. More posteriorly a second area of granulation 2 by 2.5 cm. was noted, from which fluid was escaping in appreciable quantities. Some resistance to flexion of the neck was appreciated by the examiner. The pupils were fixed at 4 mm. diameter. A rotatory nystagmus was present. The optic disks were pale, more so on the right side; the patient appeared to be totally blind. The corneal reflexes were present and active. Some voluntary movement was present in the right arm and hand. The right leg was in a state of spastic flexion; the left in spastic extension. Both feet were in plantar

flexion with evident shortening of the Achilles tendon.

A lumbar puncture disclosed the fluid to be clear and colorless, and under a pressure of 80 mm. Removal of 50 cc. failed to produce any appreciable change in the swelling at the vertex.

Roentgenograms of the skull disclosed a massive defect at the vertex involving the upper portion of the frontal and both parietal bones, more extensive on the right side. A metallic foreign body measuring 0.5 by 1.3 cm. was noted in the region of the tentorium on the left side.

The entire scalp was shaved and wet dressings with terramycin and penicillin were begun on the granulating areas.

Because of the persistence of the cerebrospinal fluid fistula, an attempt was made to close it at operation. Following this procedure, a spinal puncture disclosed 27 cells per cm.

On 9 January 1952, a bifrontoparietal craniectomy was done under general anesthesia. It was found that the previously placed fascial graft contained gross defects. A ventricular tap on the left disclosed a cloudy fluid, 35 cc. of which were recovered. An exploratory needle puncture of the right temporal lobe encountered frank pus. An abscess communicating with the right lateral ventricle was outlined and resected. A combined fascia lata transplant and Gel film closure of the dural defect was made.

After operation, cerebrospinal fluid continued to escape from the wound and collect in the subgaleal space. Culture of this fluid disclosed the presence of a *Staphylococcus* and a *Proteus* sp. Because of this infection the wound was widely opened (30 January) and again treated as a cerebral fungus with the administration of terramycin and streptomycinase.

In spite of efforts to maintain the patient's nutrition with special formulas given by nasal tube, the course was progressively downhill. During this period of observation, there was no indication of return of consciousness or attempts at speech. He re-

mained sensitive to stimulation as evidenced by acceleration of respiration and pulse when the stomach tube was manipulated or braces applied to the extremities. His course was complicated by respiratory distress (necessitating tracheotomy), bilateral keratitis, ducubitus ulcers, flexion contractures, and marked cachexia.

On 27 March 1952, evidence of increased intracranial pressure, presumed to be the result of an intraventricular hemorrhage, was observed. Repeated spinal and cisternal taps failed to relieve this situation and death occurred on 28 March 1952.

#### MORBID ANATOMY

An autopsy was performed on 29 March 1952. General examination disclosed extreme cachexia, the body weighing *ca.* 80 pounds. The margins of the cranial defect (16 by 10 cm.) could be palpated beneath the healed midline incision. The area enclosed was soft and fluctuant. A severe degree of bronchopneumonia was associated with a moderate tracheobronchitis. The liver, pancreas, spleen and kidneys were grossly normal. The bladder wall was markedly thinned, incident to chronic distention.

The scalp was incised in the usual manner and the remaining portions of the calvarium reviewed. The situation thus disclosed was described as follows: "There is an absence of the dura and a tremendous fibrous reaction between the seminecrotic, herniated brain tissue and the fringe of dura and leptomeninges so that the entire dorsal surface of the brain appears as a granular yellowish gray, fungating mass which is almost 'soupy.' The architecture is obliterated so that only in the periphery can the normal convolutions and architecture be discerned. Large cystic cavities filled with fluid are palpated through the partially organized necrotic surface. After prolonged fixation, serial coronal sections show almost total loss of cerebrum and almost complete destruction of all landmarks. There are abscesses walled off by yellow pigmented granulation tissue, areas of hemorrhage and frank suppuration.

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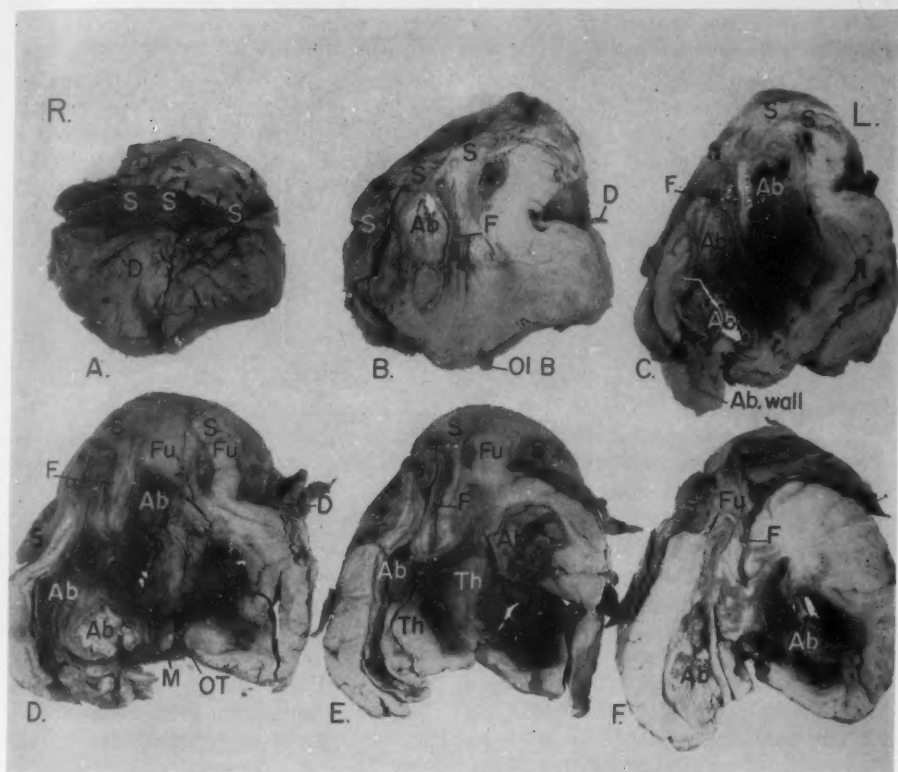


FIG. 1. Six sections of the brain, in which the chief features are indicated. The levels are as follows: A, frontal pole; B, olfactory bulb; C, just in front of anterior perforated substance; D, mammillary body; E, red nucleus; F, pineal body. Much of the right side of the brain has disappeared, as indicated by the position of the falx (F) in each of the sections. The brain fungus (Fu) is visible in Sections D, E, and F, and in F the fungus is seen to extend to an opening in the scalp (S). Numerous abscess cavities (Ab), some of them filled with blood clot, are to be seen. This clot, evidently from a terminal hemorrhagic effusion, also infiltrated the regional white matter. The region outlined by arrows in A is the surface of the cortex. D, dura; M, mammillary body; Ol B, olfactory bulb; OT, optic tract; Th, thalamus, (AFIP Neg. 53-24643).

\* Key to abbreviations in Figs. 1, 2, and 3. A, amygdala; Ab, abscess; CC, corpus callosum; C Pl, choroid plexus; D, dura; F, falx; Fu, fungus cerebri; G, geniculate bodies; Hip, hippocampal formation; ILS, inferior longitudinal sinus; IR, island of Reil; M, mammillary body; Ol B, olfactory bulb; Ol T, olfactory tract; OT, optic tract; P, pineal body; Put, putamen; RN, red nucleus (approx.); S, scalp and fascia lata graft; SLS, superior longitudinal sinus; Sn, substantia nigra; Th, thalamus; IV, trochlear nerve.

The areas of hemorrhage extend into the midbrain and brain stem."

There was no gross evidence of meningitis. The brain stem and midbrain showed no morphological changes. The large arteries at the base presented a normal appearance.

A restudy of the coronal sections pre-

served at the Armed Forces Institute of Pathology was made in an effort to determine the amount of cerebral tissue lost in the herniation, the effects of distortion within the cerebral hemispheres and the precise location of the abscesses and hemorrhages (Fig. 1).

The first section passed through the frontal lobes just anterior to the genu of the corpus callosum, the superior longitudinal fissure above and below being easily identified. The upper portion of the left frontal lobe was stained with blood, the outlines of the clot above being sharply delineated at this level. The cavities of two heavily encapsulated abscesses which communicated with one another could be identified in the upper part of the right frontal lobe.

The second section, which passed through the tips of the temporal lobes and anterior portion of the corpus striatum (Fig. 2 A), showed the remaining tissue of the right frontal lobe to be occupied by three heavily encapsulated abscesses which still contained inspissated pus. Only a small bit of cortex of the gyrus rectus of the basilar surface of the frontal lobe could be identified. The conformation of the left frontal lobe was made out more clearly, although only a small segment of the inferior or outer part of the putamen was recognized. A multilocular blood clot had obliterated all other interior detail. In the upper part of the lobe, the clot was well circumscribed; in the lower

part, it stained the softened corpus striatum somewhat diffusely.

The third section evidently passed through the basal ganglia approximately at the level of the posterior limb of the internal capsule (Fig. 2 B). Only the outlines of the temporal lobe and the insula on the left could be distinguished. On the right there remained only a much attenuated and somewhat disorganized cortex of the temporal lobe. Otherwise, the entire interior of the cerebral hemispheres was softened and infiltrated by hemorrhage (left) or replaced by abscess (right). The upper portions of both hemispheres had more or less lost their identity in the cerebral fungus. This part of the brain was adherent to the overlying scalp.

The fourth section was taken through the thalamus and posterior part of the third ventricle (Fig. 3 A). The posterior portion of the body of the corpus callosum, the thalamus on either side and upper brain stem and the body of the greatly enlarged right lateral ventricle could be readily recognized. The lower left centrum was occupied by a blood clot, the upper by an encapsulated ab-

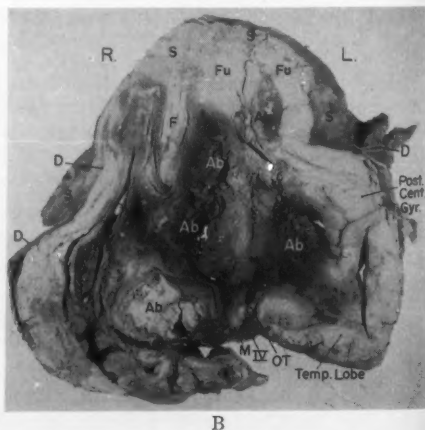
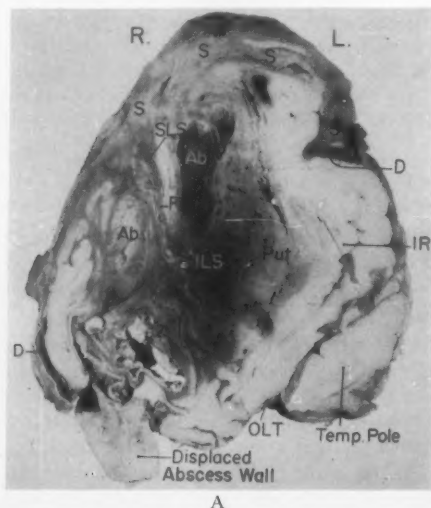
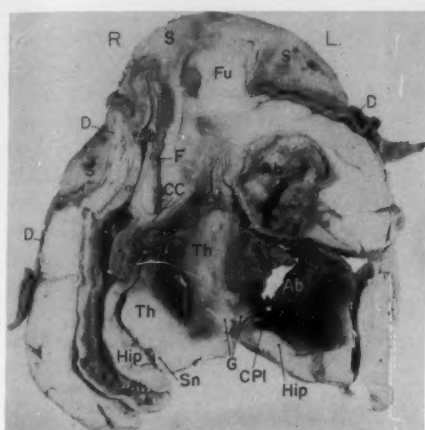
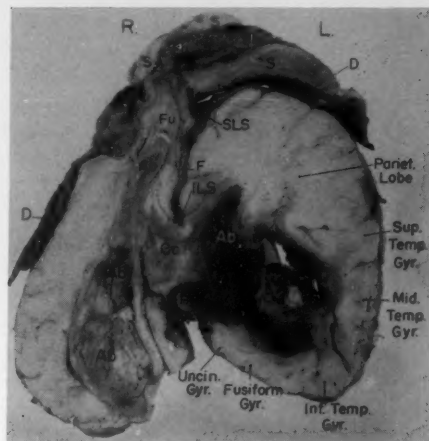


FIG. 2. *A* and *B* are enlargements of Figs. 1C and 1D. *A* is from a level just in front of the anterior perforated substance, and *B* is from the level of the mammillary body. See key for abbreviations.\* (AFIP Negs. 53-21799 & 800).



A



B

FIG. 3. *A* and *B* are enlargements of Figs. 1E and 1F. *A* is from the level of the pulvinar of the thalamus, and *B* is from the level of the pineal body and splenium of the corpus callosum. The cerebral fungus is most conspicuous in these two photographs. See key for abbreviations.\* (AFIP Negs. 53-21801 & 802).

scuss. The third ventricle was filled with blood. The body and inferior horn of the right lateral ventricle was lined with partially organized granulation tissue. The upper reaches of this enlarged and deformed ventricle extended directly into the cerebral fungus.

The fifth section passed through the splenium of the corpus callosum and the pineal body (Fig. 3B). The contours of the left cerebral hemisphere were readily identified at this level. The lateral ventricle on this side was occupied by partially organized granulation tissue stained by blood pigment. The regional white matter had been destroyed by a hemorrhage. The greatly enlarged left lateral ventricle was lined with organized granulation tissue; its dependent portion was filled with old exudate.

In general it may be stated that the upper part of the central portion of both cerebral hemispheres and the covering dura mater had been destroyed by the initial impact of the missile and indriven bone fragments, exposing the bodies of the lateral ventricles. What remained ultimately herniated into the cranial defect to form a cerebral fungus. This destruction was more marked on the

right than on the left. Much of the remaining portion of the right cerebral hemisphere had come to be occupied by multiple abscess cavities, some of which had ultimately ruptured into the lateral ventricle, forming a veritable intraventricular abscess. On the other hand, the lower portion of the left cerebral hemisphere at this level, including most of the thalamus and all of the corpus striatum, had undergone softening, presumably through an interference with their circulation. As a terminal event, one or more gross hemorrhages had taken place into this softened tissue and had ruptured into what remained of the left lateral and third ventricles, even staining the purulent contents of the greatly enlarged body and inferior and posterior horns of the right lateral ventricle.

#### HISTOPATHOLOGY AND CELLULAR PATHOLOGY OF FUNGUS CEREBRI

Blocks of tissue were taken from representative portions of the specimen, being selected with the view of determining both the architectural and cellular alterations taking place in the nervous tissues as a result of the various lesions observed on gross examination of the brain. Sections

were appropriately stained or impregnated according to the information desired in each instance as outlined in the following questions. What was the combined effect of the fungus, abscesses of the brain and attendant cerebral edema on the apparently unaltered cortex? What was the ultimate effect of the fungus on the adjacent brain? What changes characterized the final reparative process in the fungus proper? Does the reaction to abscess formation differ in the presence of fungus than in other circumstances? The answer to these questions was to be sought in an investigation of the microscopic sections.

*Reaction of Apparently Unaltered Cortex.*

—Sections taken from presumably unaffected cortex were prepared by routine methods, including Nissl's stain for an investigation of the meninges, cortical nerve cells and interstitial elements. The leptomeninges were found to be slightly thickened, largely through a proliferation of the fibrous elements. Throughout these membranes were found small collections of brown

granular pigment, presumably hemogenic, which seemed to be enclosed within the various constituent elements, including the endothelial cells of the small blood vessels. The cortical nerve cells were somewhat decreased in number with obvious patchy areas of loss in the intermediate laminae. The individual cells showed focal condensations of tigroid substance in the smaller elements while the larger ones presented an advanced degree of chromatolysis. These cells were also characterized by folds in the nuclear membrane, although the nuclei themselves were centrally placed. These cytological features are shown in Figure 4. There was no significant change in the structure of the interstitial elements other than the expected acute swelling of the oligodendroglia.

These same alterations were observed in the hippocampal gyrus adjacent to a focal hemorrhage but not directly affected by it.

*Changes in the Cerebral Cortex Suprajacent to Gross Lesions.*—One block, taken from the cortex and subcortex over an ab-

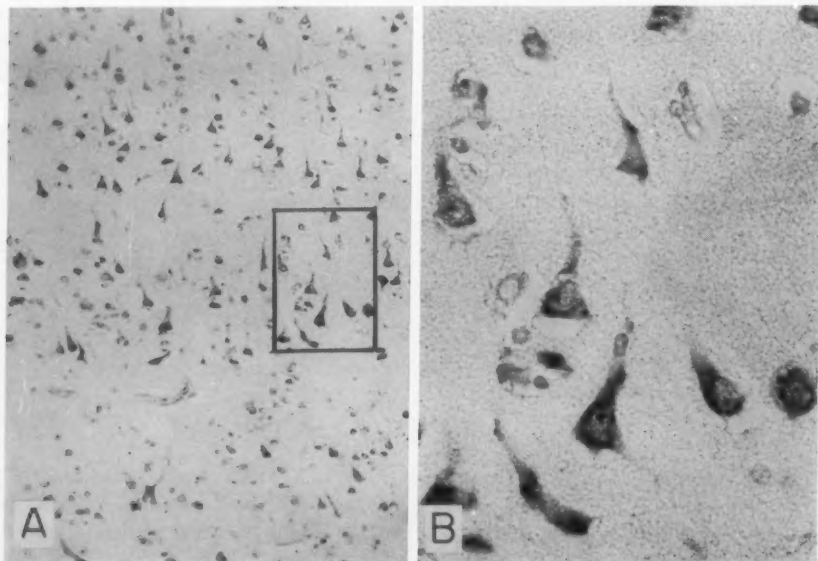


FIG. 4. Effect of fungus on cerebral cortex. *A* shows a diffuse and patchy loss of cortical nerve cells.  $\times 150$ . *B* is an enlargement of enclosed area in *A* to show chromatolysis of nerve cells with condensation of remaining material about the nucleus.  $\times 550$ . Nissl preparation.

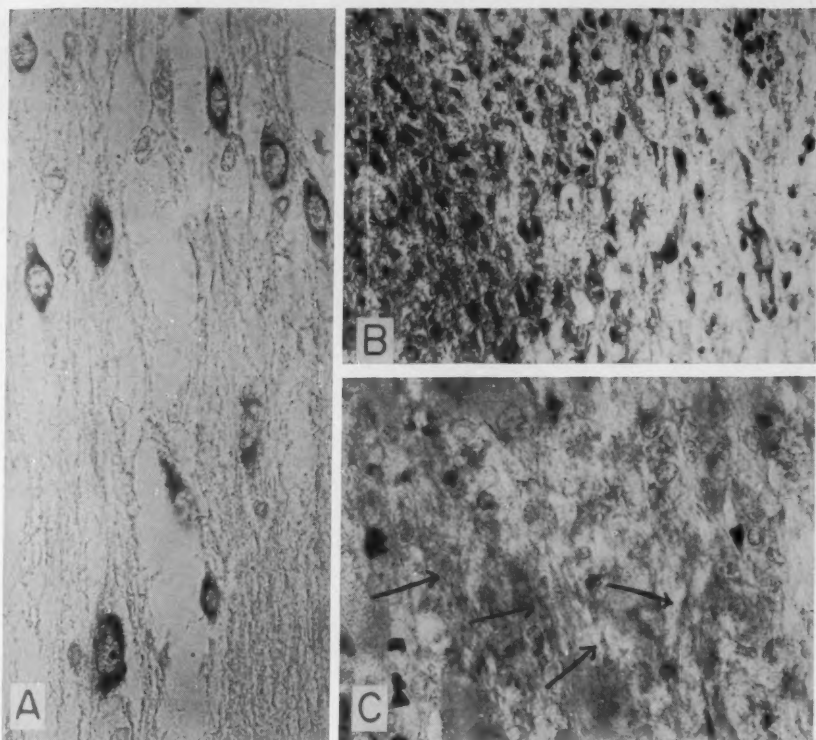


FIG. 5. Effect of abscess on regional brain tissue. *A* shows diffuse loss of nerve cells in regional cortex with chromatolysis in those that remain. Nissl preparation.  $\times 550$ . *B* shows local subcortical proliferation of fibrous astrocytes. Gold sublimate.  $\times 75$ . *C* indicates almost complete destruction of myelinated nerve fibers in white matter adjacent to abscess. Only faint shadows of fibers remain (arrows) which stain but faintly with iron hematoxylin. Weigert's preparation.  $\times 550$ .

sscess, disclosed a distorted cortex. The subspial astrocytes (gold sublimate preparation) were proliferated but somewhat flattened. The nerve cells presented a radiating arrangement. These cells had undergone chromatolysis or condensation of tigroid material as seen elsewhere (Nissl's preparation). The astrocytes in the cortex proper (gold sublimate preparation) had undergone fibrous transformation and displayed a tendency to patchy proliferation. The myelinated nerve fibers (iron-hematoxylin preparations) of the cortex and subcortex had largely disappeared and only a few decadent fibers as well as varicose segments and end bulbs were still evident. In this area the astrocytes observed in the gold

preparation assumed a parallel arrangement, except adjacent to the abscess where they had undergone amoeboid change. These various alterations are indicated in Figure 5.

*Reaction of Brain Tissue in Periphery of Fungus.*—This block was taken at the margin of the fungus which was covered by scalp and which also showed in its deeper portion the wall of an abscess. The consecutive layers from without in were the scalp, subcutaneous tissue, leptomeninges, cortex, a small stratum of altered white matter and the capsule and granulation tissue lining of the abscess itself. The skin of the scalp was very thin, showing occasional hair follicles. Beneath this was found a loose connective



tissue stroma representing the subdermal stroma. The *leptomeninges* were thickened, chiefly the result of proliferation of the fibrous elements. Small irregular masses of calcium were found in these membranes. The rather attenuated and distorted cerebral *cortex* showed a mild proliferation of the subpial glial layer (gold sublimate preparation). Because of distortion, the laminations of the cortex were misaligned; a patchy loss of the constituent nerve cells was still quite evident (Nissl's preparation). At times the remaining cells were found in clumps or clusters. In the smaller cells of the superficial laminae, the tigroid material was fused into an irregular solid, deep blue mass at one pole of the cell. In the larger elements, it was reduced to a faint bluish granular dust. The cortical blood vessels were normal in number and structure (Perdrau preparation). The thin zone of *subcortical white matter* appeared to be somewhat compressed. The myelin sheaths of the nerve fibers (iron-hematoxylin method) were largely degenerated. The astrocytes (gold sublimate preparation) were greatly altered and were poorly impregnated. Most of them had lost their processes, assuming the so-called amoeboid form. The neuroglial fibrillae (phosphotungstic acid-hematoxylin stain) were arranged in more or less parallel bundles (piloid form) to form an isomorphic scar.

As one approached the "capsule" of the abscess, there was more and more evidence of reaction. The blood vessels increased in number, the result of endothelial proliferation, compound granular corpuscles were found, and fibroblasts were being elaborated by the vessels to enter into the scar. Accentuation of the vascular reticulin was made very clear by the silver (Perdrau) preparation. Lymphocytes collected largely about regional blood vessels indicated a specific tissue reaction to the infection. The connective tissue in the abscess capsule proper was quite dense, obviously being derived from a zone of newly formed blood vessels. The silver preparation (Perdrau) emphasized the density of reticulin in the capsule,

for it was somewhat less dense in the granulation tissue layer and terminated abruptly in a wavy border beneath the purulent contents of the abscess cavity. These alterations as seen from the scalp to the interior of the abscess are depicted in Figure 6.

*Structure of Fungus Proper.*—In order to gain some detailed impressions of structural alteration in the main portion of the cerebral fungus, blocks of tissue were taken from the dense connective tissue layer which surmounted it, as well as the white matter which formed the chief mass of herniated tissue (the cortex and subcortex of the cerebral vertex were destroyed at the time the wound was sustained). The stratum of *covering connective tissue* which overlay the hernia presumably was the fascial transplant together with the organized original layer of granulation tissue which once covered the fungating mass. All this was now fused into a heavy layer of hyalinized connective tissue. In the Perdrau preparation, this zone was seen as an almost solid band of reticulin fibers in parallel wavy strands. The collagen material (phosphotungstic acid-hematoxylin) likewise assumed a parallel and wavy pattern.

In the *white matter* of the cerebral fungus only a few bundles of preserved myelin sheaths (iron hematoxylin method) could be found. In the rest of the section, these elements were represented by irregular varicose strands, myelin balls and myelin end bulbs. Many compound granular corpuscles (myelinophages) were found in this region, all filled with degenerating myelin, presumably in the form of free fat. The axis cylinders (reduced silver preparation) were also largely destroyed, and appeared only as argentophilic varicose segments, elongated fragments and round granules. The remaining fibers showed varicose swellings throughout their course. Compound granular corpuscles laden with rounded particles or even segments of nerve fibers were numerous.

The essential alterations in structure found in the cerebral fungus proper are shown in Figure 7.

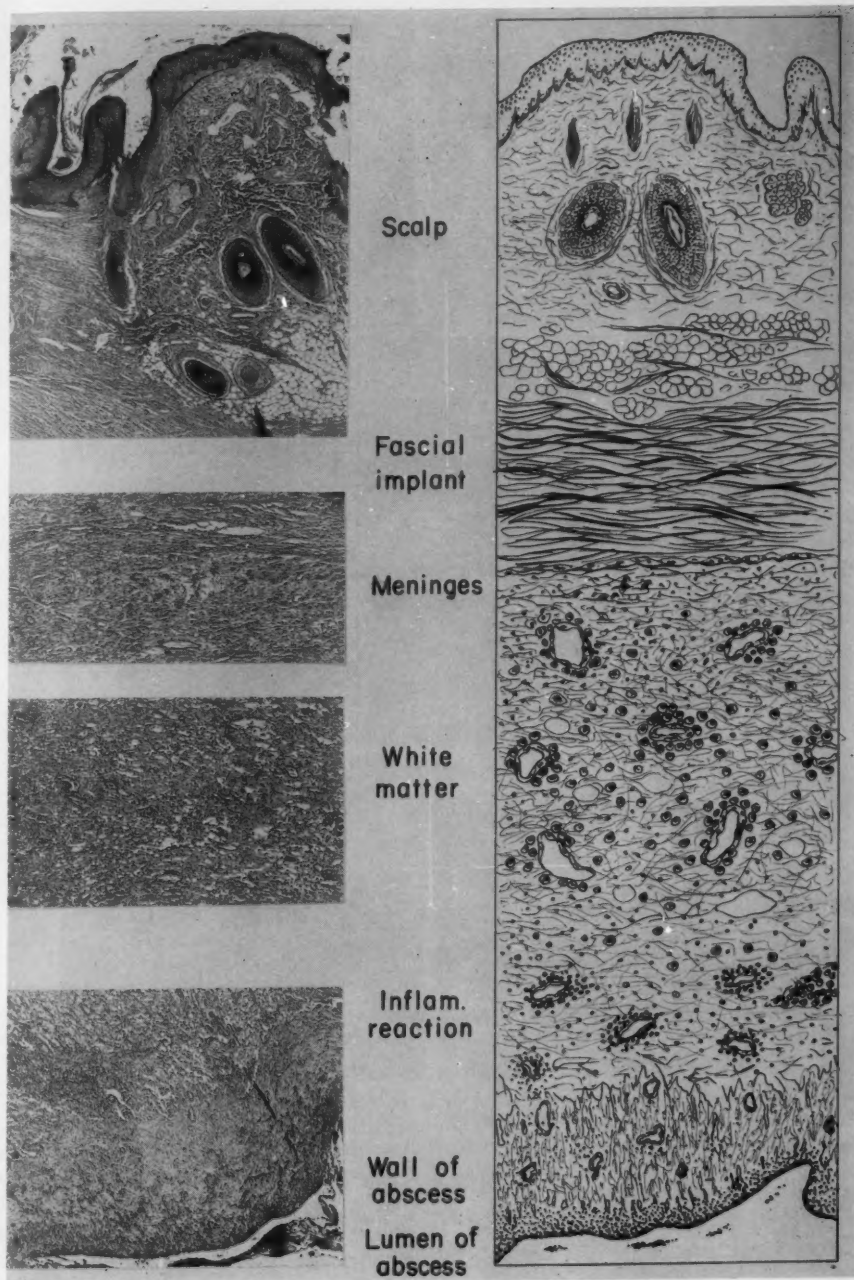


FIG. 6. Reaction of brain tissues to fungus cerebri. Photomicrographs in left column show structure of various layers while drawing on right emphasizes nature of reaction. The labels explain details.

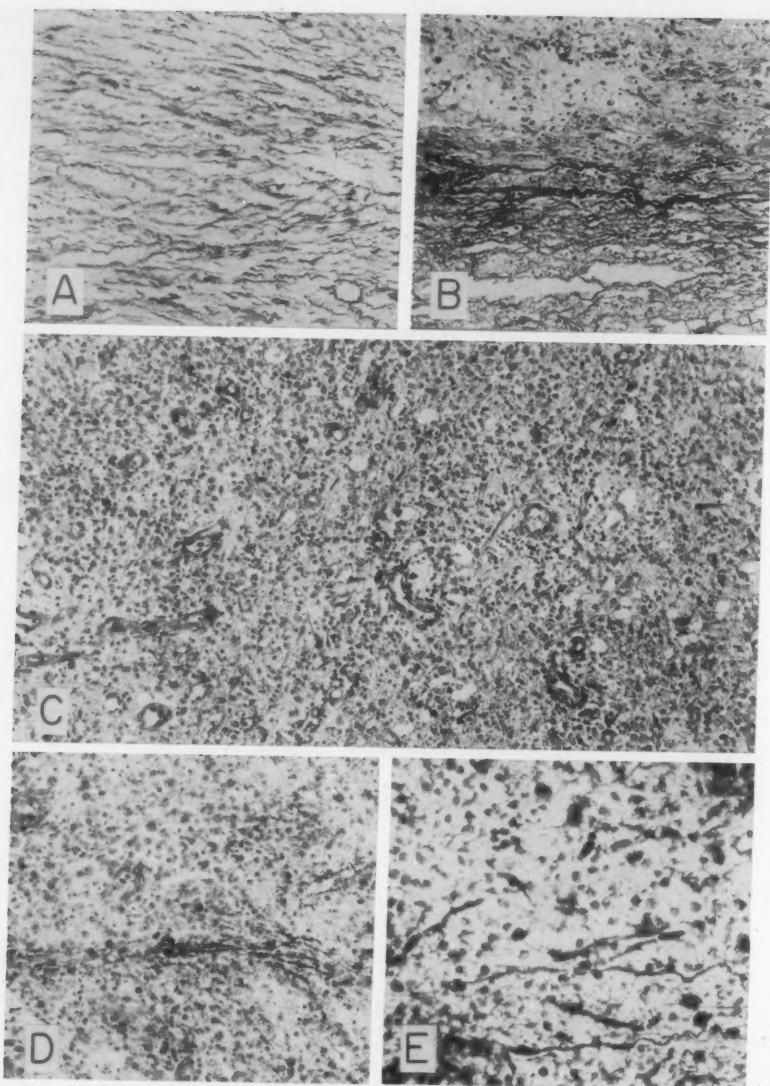


FIG. 7. Structure of cerebral fungus. *A.* and *B.* show connective tissue reaction at surface of the fungus. *A.* Perdrau preparation showing reticulin fibers arranged in parallel.  $\times 80$ . *B.* Phosphotungstic acid-hematoxylin stain showing hyalinized collagen fibers above and glial fibers below.  $\times 80$ . *C.* Structure of greatly altered white matter with infiltration of lymphocytes, leukocytes and compound granular corpuscles. Blood vessels show mild endothelial proliferation. H & E.  $\times 80$ . *D.* Scattered bundles of altered myelin sheaths are shown. Iron hematoxylin.  $\times 130$ . *E.* Tortuous and varicose axis cylinders. Reduced silver.  $\times 280$ .

*Comment.*—In this case one finds a relatively rare example of cerebral fungus with an extended survival period, sufficiently long for chronic changes to have developed in the architecture and cytology of the nervous tissues. The upper portions of both cerebral hemispheres, the dura and the intermediate portion of the superior longitudinal sinus had been destroyed with the vertex of the cranium by a shell fragment. The wounded man remained comatose, paralyzed and decerebrate throughout the survival period of 87 days. At autopsy, the extensive loss of cerebral tissue and the presence of several large, well encapsulated abscesses were disclosed. Thus, the traditional mechanism of cerebral fungus was verified,—the abscesses serving as the *modus operandi* in maintaining an increased intracranial pressure and in causing progressive protrusion of brain tissue. The organization of the superficial layer of granulation surmounting the fungus into a stratum of hyalinized connective tissue, the secondary degeneration of the myelinated nerve fibers in the white matter forming the central mass of the fungus, and the characteristic astrocytic and vascular reactions of the tissues adjacent to the abscesses, all appear to be characteristic tissue responses to this situation.

#### THE PATHOGENESIS OF CEREBRAL FUNGUS

The development of the concept of pathogenesis of a cerebral fungus has been described in another connection (Richland and Courville, 1951) and need not be repeated here. Perhaps the first investigator to have a clear understanding of the problem was Miller (1842), who correctly asserted that in order for a cerebral fungus to develop three factors had to be present: (1) a traumatic defect in the cranium, (2) a corresponding loss of the regional meninges (particularly the dura mater), and (3) a disorganization of the underlying brain by inflammation. Miller's concept of the steps in the formation of a fungus leaves little to be desired.

"The pouting prominence of brain at first

merely fills the cranial orifice; it then shoots above it; and, in no long time, it may attain to a considerable size. Now probably, its neck becomes impacted in the cranial aperture, is strangulated there, and sloughs; a fresh protrusion, however, takes place, and the progress is as before. Portion after portion of the upper part of the brain may be lost in this manner, without apparent and direct injury to the cerebral functions; but, sooner, or later, the formidable constitutional irritation which accompanies it will prove fatal; and there is besides a risk of the disorganizing inflammation extending unduly and fatally from the original site."

The wars of the middle decades of the nineteenth century offered abundant opportunity to prove the truth of this assertion. Demme (1861) in Italy and Guthrie (1862) in the Crimea also concluded that inflammation and secondary hemorrhage continued what was begun by primary traumatic hemorrhage and edema. In our country, Hamilton (1865) was able to draw from his own experience in the War Between The States and to point this out. He wrote:

"The conditions which may give rise to a cerebral hernia are congestion or inflammation of the entire mass of the brain or of portions, effusions of lymph, serum or pus into the cavities of the brain, upon its surface or into any part of its structure. Probably in most cases the hernia is due to an effusion of pus in some point of the structure of the brain—that is, to the formation of an abscess, or to the effusions of serum into the ventricles."\*

The surgical experiences in World Wars I and II have led to a more particular scrutiny of the factors involved in the production of cerebral fungus. A number of studies have been made and contributions published on this subject as a result of observations in

\* In Holmes' *System of Surgery* (1881), the writer on this subject notes that "there is no doubt that hernia cerebri is mainly due to inflammation of the brain" and that "abscesses of various sizes, sometimes very large, are not infrequently found in the hemisphere involved."

World War II (Cairns, 1940; Cairns, Ascroft and Hannah, 1940; Eden, 1940; Schwartz and Roulhac, 1945; Campbell and Martin, 1946). All of these observers agree that infection lies at the root of a cerebral fungus. This infection is driven into the brain with fragments of cap, scalp (and hair) and bone along with the missile. It is because this combination of factors is common in war wounds that cerebral fungus is so characteristically a lesion of military concern. The infection may begin as a diffuse process, but usually one or more isolated abscesses are ultimately formed within the cerebral centrum. The space occupied by the abscess of abscesses, together with the attendant edema, results in a progressive protrusion of the cerebral substance through the dural-cranial defect. It is this infectious element which transforms what might have been a benign cerebral hernia into a true fungus cerebri.

It is the failure to recognize the inflammatory basis for this progressive protrusion of brain tissue of a cerebral fungus which has led to inadequate efforts at prevention and misdirected attempts at surgical treatment.

#### SUMMARY

This report is based on the pathological observations in a case of a fungus cerebri which resulted from a gross missile wound of the vertex of the cranial vault sustained by a soldier of the United Nations in the Korean War. At autopsy, gross destruction of the upper portions of both cerebral hemispheres and the covering meninges was found to have occurred. The presence of multiple encapsulated abscesses and terminal hemorrhagic extravasations was also disclosed on section of the brain. The undamaged cortex was essentially unaltered but the cerebral tissues at the margin of the cerebral fungus presented degenerative changes in the nerve cells and fibers, proliferative reaction in the neuroglia and blood vessels, particularly in the vicinity of the abscesses. These architectural and cellular

changes were reviewed in some detail. It should be emphasized that it is the early hemorrhagic extravasations and edema and subsequent inflammatory reactions in the nervous tissues which essentially are responsible for the formation of a cerebral fungus. Without this understanding of its pathogenesis, efforts at prevention will be inadequate and attempts at a cure will be misdirected.

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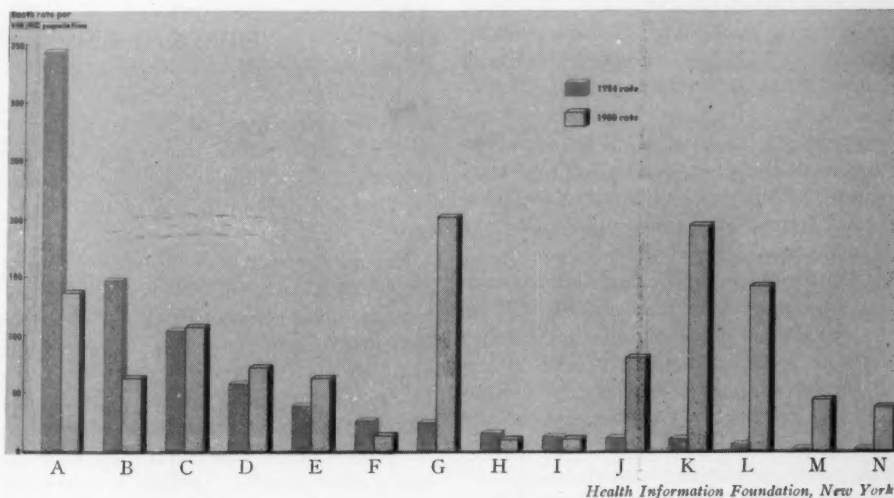
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#### LEADING CAUSES OF DEATH, UNITED STATES, 1900 AND 1954



- A. Diseases of the heart
- B. Malignant neoplasms
- C. Vascular lesions of central nervous system
- D. Accidents (all forms)
- E. Certain diseases of early infancy†
- F. Hypertension and general arteriosclerosis†
- G. Influenza and pneumonia (except pneumonia of

- newborn)
- H. Diabetes mellitus
- I. Congenital malformations
- J. Chronic and unspecified nephritis,\* etc.
- K. Tuberculosis (all forms)
- L. Gastritis, enteritis, diarrhea, etc.
- M. Bronchitis
- N. Diphtheria

\* Caution must be exercised in interpreting rates for diabetes mellitus and nephritis in view of changes in definition.

† Modified classifications to improve comparability.

# Increased Intracranial Pressure in Penetrating Craniocerebral Trauma\*

By

ARNOLD M. MEIROWSKY, M.D.

HARVEY CUSHING wrote his now classic *Study of a Series of Wounds Involving the Brain and Its Enveloping Structures*<sup>1</sup> "with the object of placing on record the account of a consecutive series of surgically treated cases with penetrating craniocerebral trauma, with results good and bad." Any comments that we may be able to make today on the various aspects of increased intracranial pressure in the presence of penetrating craniocerebral trauma, are based fundamentally on the observations made by Harvey Cushing. Our clinical knowledge has been enhanced tremendously by the work of American, Canadian and British neurosurgeons, in combat zones during World War II. Notably among them are Eldridge Campbell,<sup>2,3</sup> Henry Schwartz,<sup>4</sup> Donald Matson,<sup>5</sup> Harry Botterell,<sup>6</sup> Sir Hugh Cairns,<sup>7,8</sup> and many others. New impetus has been added to our understanding of the neurophysiological aspects of increased intracranial pressure in the presence of trauma by the investigative work of Joe Evans and his group.<sup>9-11</sup>

Our discussion, then, can at best be a sum total of experiences that have been recorded in three wars. Present day management may differ in technical particulars. The student of Harvey Cushing's comments and annotations, accompanying his case reports, will find recorded there the fundamental problems which remain our concern today.

In combating increasing intracranial pressure and its sequelae in the presence of penetrating craniocerebral trauma,<sup>12</sup> considera-

tion need be given to a number of steps which I should like to list in this order:

1. Maintenance of an open airway.
2. Evacuation of space-occupying and/or expanding intracranial lesions such as foreign bodies and clots.
3. Resection of devitalized and devitalizing tissue, the retention of which would bring about cerebral swelling and a shift of midline structures.
4. Restoration of venous channels, impaired by penetration.
5. Prevention of infection.
6. Surgical treatment of existing cerebritis.

The first point needs little elaboration. The coma position, which has been described and advocated by Eldridge Campbell,<sup>13</sup> has proved to be the most important single factor in the maintenance of an open airway. It facilitates intratracheal suctioning, prevents aspiration and virtually does away with any need for such radical measures as tracheostomy.

For an elaboration of the other points, a consideration of various types of brain wounds might serve to bring out the problems that present themselves in the management of increasing intracranial pressure. Documented statistics, obtained during the Korean War, have lent added significance to the tenet, already held by Harvey Cushing, that *earliest possible definitive neurosurgical intervention is the most important single factor in the prevention of cerebritis and the increasing intracranial pressure resulting therefrom*. Joseph Barnett's study,<sup>14</sup> relative to the occurrence of intracranial hematomas in casualties receiving definitive care within eight hours, substantiates the necessity of earliest possible definite neurosurgical intervention in order to combat effectively increasing intracranial pressure.

\* Presented as part of Symposium on Increased Intracranial Pressure at the annual meeting of the Harvey Cushing Society, May 16, 1955, Quebec, Canada.

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## NON-INFECTED BRAIN WOUNDS

*The Uncomplicated Wound.* I should like to pass over such general measures as initial wound care, management of the comatose patient, immediate use of antibiotics and omission of sedatives and analgesics, for they are well established, but should like to emphasize that the sum total of all of these measures, when instituted within hours after the brain wound has occurred, represents a decisive weapon to relieve increased intracranial pressure and to prevent its devastating sequelae.<sup>15</sup>

The effective surgical management of the uncomplicated wound of the brain includes these steps:

1. Radical excision of all layers of the scalp at site of penetration.
2. Craniectomy with resection of all depressed and comminuted bone fragments.
3. Excision of the dural edges at site of penetration. Liberal enlargement of the dural opening to permit inspection of the cortex surrounding the site of penetration.
4. Resection of all devitalized and devitalizing brain tissue surrounding the entrance to the missile canal by means of "clip and cut" method. (The use of the cutting current in contused brain tissue more often than not leads to edema and secondary increase of intracranial pressure.)
5. Removal of all pulped brain tissue from the missile canal with suction and irrigation.
6. Removal of all indriven comminuted bone fragments.
7. Removal of all accessible metallic fragments.
8. Airtight dural closure, if necessary, by employment of a graft of pericranium, temporal fascia or fascia lata. (Prevention of infection, prevention of herniation.)
9. Primary closure of scalp in individual layers, if necessary, by employment of rotation flap.

Certain specific data seem worth mentioning

in special types of brain wounds.

*Tangential Wounds.* While increased intracranial pressure does not always result from tangential bullet wounds of scalp and skull,<sup>16</sup> the story of K-1875, illustrates the events that may lead to a clinically significant rise in pressure as direct sequela of the impact of a non-penetrating tangential missile. Wounded in action in Korea by a glancing missile, he sustained a tangential scalp laceration in the right parieto-occipital region that did not produce a skull fracture. Radical debridement and primary closure of the scalp wound were performed a few hours after the patient had been wounded. Within three days he developed throbbing headaches, bradycardia and progressive drowsiness. A right occipital craniotomy was performed. A venous extradural hematoma was evacuated. The dura was opened. Encephalomalacic tissue herniated through the dural opening. Its resection revealed an extensive subcortical hematoma which was evacuated. Post-operatively, the pulse rate returned to normal within five days. The patient made a full recovery.

*Penetrating Brain Wounds with Associated Hematoma.* Reference has already been made to the analysis of the incidence of hematomas in a consecutive series of 316 casualties with penetrating wounds of the brain who were received for definitive neurosurgical care from 3 to 8 hours after first aid.<sup>14</sup> Of the 316 penetrating wounds, 146 (46.2%) were complicated by confined intracranial hematomas. The danger factor in these 146 casualties was increasing intracranial pressure. Comparative statistics readily reveal the gravity of this danger factor. The incidence of confined hematomas in a consecutive series of casualties received in a rear installation 24 to 72 hours after first medical aid, at a time when mobile teams were not available at division level in Korea, was only 7%.

*Illustrative Case K-511.* A 25-year-old Canadian infantryman wounded in action by a booby trap explosion in December, 1951, sustained a penetrating wound of the left temporal area. Restless and semistuporous,

he showed moderate weakness of right arm and leg. Examination of the head revealed a small circular wound of entry in the left temporal area. The clinical evidence was that of increasing intracranial pressure because of a rapidly expanding intracranial lesion in the presence of a low velocity wound. The missile tract contained a large intracerebral hematoma. There was also a moderately large subdural hematoma. Numerous comminuted pieces of bone were removed from the missile tract and primary closure performed. Follow-up notes on this patient, which have been received through the courtesy of General Coke, Director General of the Medical Services of the Canadian Army, indicated that the patient has no neurological deficit. Direct communication with this patient revealed that he was employed and seemingly rehabilitated. The high incidence of confined intracranial hematomas in conjunction with penetrating wounds of the brain represents one of the most important causative factors in the development of increased intracranial pressure. Early definitive neurosurgical intervention is the answer to its control.

*Transventricular Wounds.* Because of their extent, transventricular wounds present invariably menacing increased intracranial pressure. The management of these wounds has been described by Henry G. Schwartz and George Roulhac.<sup>17</sup> A consecutive series of casualties with transventricular wounds, incurred in the Korean War, has been reviewed by Gordon Wannamaker.<sup>18</sup> In the majority of these cases, surgical steps as have been outlined earlier suffice to overcome increased intracranial pressure. In extensive transventricular wounds with loss of an entire lateral ventricle, obstructive hydrocephalus with rapidly increasing intracranial pressure may develop secondarily, as illustrated by the "Story of K-735." At initial operation, the right lateral ventricle was found to be destroyed. Subsequently, fluid became trapped in a cavity which did not provide access to an absorbing surface. Obstruction of the foramen of Monroe by a small clot and by necrotic debris occurred. In a secondary operation, the patency of the

foramen of Monroe was reestablished; however, for fear of recurrence, a ventriculocisternostomy was performed. The patient, who had elapsed into deep coma prior to secondary craniotomy, regained consciousness postoperatively.

*Dural Sinus Wounds.* The impairment of venous circulation as caused by wounds of dural sinuses almost invariably leads to increased intracranial pressure, as was brought out in an analysis of 112 such cases incurred in the Korean War.<sup>19</sup> Some data of interest stem from experimental occlusion of dural sinuses in monkeys, studies which are carried out in conjunction with Guy Owens, Gray Stahlman and Joe Capps.<sup>20</sup> Obstruction of the Rolandic veins and/or the superior longitudinal sinus posteriorly to the Rolandic veins invariably resulted in cortical swelling. Occlusion of the superior longitudinal sinus posteriorly to the Rolandic veins brought about a cerebrospinal fluid pressure rise in monkeys from 70 to 100 mm. H<sub>2</sub>O. Simultaneous electroencephalographic studies occurred with amplitudes ranging from 150 to 300 microvolts and bursts of slow waves of 3-5 per second.

The surgical management of dural sinus wounds needs to be directed toward the reestablishment of venous circulation if increasing intracranial pressure is to be checked. Consideration should be given to these steps:

1. Maintenance of a normal blood pressure before, during and after operation.
2. Evacuation of all clots obscuring a sinus laceration.
3. Removal of all bone fragments lodged in the wall or lumen of the torn sinus.
4. Removal of a thrombus from a lacerated sinus.
5. Surgical repair of a lacerated sinus with sutures tied over gelfoam in the presence of a small tear, or in the case of extensive laceration with a muscle stamp, permitting recannulization.

Wounds of the superior longitudinal sinus posteriorly to the Rolandic veins, despite these measures, tend to be accompanied by a continued rise in pressure for some days

postoperatively. Responsible for this is continued liquefaction which will go on until physiologically adequate collateral circulation has established itself, or until recannulization has taken place. This is well brought out by K-70, who sustained a biparietal shell wound resulting in spastic triplegia. A thrombus was removed from the sinus laceration posteriorly to the Rolandic veins and the sinus repaired with sutures tied over gelfoam. Debridement of the brain wound was carried into the torn third ventricle. Nineteen comminuted bone fragments were removed and necrotic tissue resected; however, there was no line of demarcation. Continued liquefaction necessitated a secondary resection at which time a clearly defined line of demarcation was encountered.

The surgical steps that have been suggested in the management of wounds of dural sinuses include, then, a second stage operation, particularly in wounds involving the posterior portion of the superior longitudinal sinus and the torcular, as an added weapon in combating increased intracranial pressure.

#### INFECTED BRAIN WOUNDS

Cerebritis in its various forms leads invariably to a significant rise in intracranial tension. While adequate dosages of antibiotics in casualties of the Korean War seemed to prevent in the majority of instances the formation of encapsulated abscess, cerebritis, as a sequel of penetrating craniocerebral trauma, was induced by delayed surgical intervention, or by the retention of debris, devitalized tissue, clots and bone fragments.

Experiences in World War II and in the Korean War have demonstrated conclusively that early definitive neurosurgical care is the largest single factor in the prevention of cerebritis. The employment in the Korean War of mobile neurosurgical teams at Division level was associated with a reduction of meningocerebral infection from 41% to less than 1%.

The treatment of existing cerebritis should be designed to remove causative agents and to reverse cerebral swelling that always ac-

companies cerebritis. The treatment of choice depends on degree and extent of the existing cerebritis.

The "Story of K-1769" illustrates an effective method of surgical management applicable to limited, non-fungating cerebritis. This soldier was seen six days after having sustained a penetrating wound of the right occipital lobe. He had bioccipital and bifrontal headaches, nausea and vomiting, a left homonymous hemianopia, a left hemiparesis and moderate papilledema. He appeared drowsy and restless. Craniectomy revealed a subcortical clot, four comminuted pieces of bone and an excessive amount of cerebritic tissue surrounding the missile canal. Radical surgical resection was followed by primary closure. Through a left parietal burr hole, ventriculostomy and constant ventricular drainage were established and maintained for 36 hours. The patient made an uneventful recovery. He lives sixty miles from my home town and I have occasion to see him at regular intervals. Except for a left lower quadrantanopia, he has no neurological deficit and holds a steady job.

Lastly, consideration should be given to fulminating fungating cerebritis. A radical method of surgical management has served to reduce mortality and morbidity in this most distressing of all complications and has been an essential factor in lessening the ultimate neurological deficit.<sup>21</sup>

Prior to operation antibiotics were administered in accordance with culture and sensitivity studies.

At initial operation radical extracerebral debridement with wide resection of the involved portions of the scalp, zone and dura is performed. This leads to complete exposure of the fungating mass of necrotic cerebrum which is usually surrounded by tense, edematous, but apparently viable brain. The entire fungating mass, or area of cerebritis, is then resected until healthy though sometimes still edematous brain tissue is encountered. Meningocortical adhesions around the periphery of the wound are divided and resected, allowing the brain to retract within the cranium. Upon completion



of the initial resection, lumbar puncture is performed to facilitate further retraction of the cerebrum.

The new brain surface is then thoroughly irrigated with saline solution and covered with a square of autoclaved pure silk cloth soaked in saline solution. The moist, non-irritating piece of silk is covered with strips of vaseline gauze. To protect the brain surface further, fluffs are incorporated in the dressing which is held together by a 5-yard gauze roll. The wound is redressed, inspected and irrigated 4 hours after the initial resection and again 8 hours later. So as to keep the surface free from any appreciable accumulation of the products of progressing necrosis, it is usually necessary to repeat the irrigations every 8 to 12 hours.

The brain may again protrude above the surface of the skull, forming a true cerebral fungus. This is not disastrous, the causative edema being less damaging if the brain is allowed to expand, than if it is confined within the cranium by some artificial means. Excessive herniation may have to be controlled by lumbar punctures repeated whenever the progression of herniation is rapid.

Duration of the open treatment depends on the appearance of the cerebral surface and on the clinical response of the patient and has been employed from 3 to 82 days. As infection subsides and debris and exudate are washed away, the surface of the brain assumes a pinkish-gray appearance and takes on a firm consistency; this is usually accompanied by cessation of progressive fungation, indicating that the infection has subsided and that it may be safe to perform secondary closure at that time.

The cerebral surface is cleanly resected. The dural edges are freed, the dural defect repaired with a fascia lata graft and the scalp is closed.

*The most effective weapon against the dangers of increasing intracranial pressure in penetrating craniocerebral trauma remains early definitive neurosurgical management.*

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## Head Wounds—Fragments of Civil War History

By

PAUL E. STEINER, M.D.\*

TWO general officers were talking shop in the spring of 1864. Was it worth while having men with head wounds carried from the field? One, Brigadier General Alexander S. Webb, claimed that in his experience a case was past cure if, wounded in the head, he slowly lost his vertical position and was incapable of making a movement of his head from the ground.<sup>1</sup> The views of the other, Brigadier General James S. Wadsworth, were not recorded. Within a few weeks both were shot in the head, Webb disabled and Wadsworth dead. The coincidence of the conversation and the subsequent wounds is no less strange than is the chance recording for posterity of these events and the related experiences on the battlefield.

General Webb, commanding a brigade, previously wounded at Gettysburg in repelling Pickett's charge, was again injured while assaulting the works at the "Bloody Angle" in the battle of Spotsylvania Court House on May 12, 1864. He later wrote:<sup>1</sup> "The bullet passed through the corner of my eye and came out behind my ear. While falling from the horse to the ground I recalled my conversation with General Wadsworth; when I struck the ground I made an effort to raise my head, and when I found I could do so I made up my mind I was not going to die of that wound, and then I fainted."

But the other, General Wadsworth, a Union divisional commander, was then already dead. Six days earlier, on May 6th, the second day of the battle of the Wilderness, after having had two horses shot under him, he led his men because they were afraid, in a charge up the Plank Road, and fell from a bullet in the head.<sup>1,2</sup> His body was recovered by the Confederates who celebrated, thinking it was General Grant.<sup>3</sup> Mr. Charles

A. Dana, assistant secretary of war, with the Army in the field, sent word to Secretary Stanton on May 8th that according to rumors General Wadsworth lay senseless in a rebel hospital, shot through the brain, and sure to die.<sup>4</sup> Gideon Welles, Secretary of the Navy, wrote in his now-famous diary on the 10th:<sup>5</sup> "General Wadsworth . . . is undoubtedly slain, and his body is, I think, in the hands of the Rebels. Few nobler spirits have fallen in this war. He should, by good right and fair-dealing, have been at this moment Governor of New York, but the perfidy of Thurlow Weed and others defeated him. . . . No purer or more single-minded patriot than Wadsworth has shown himself in this war. He left home and comforts and wealth to fight the battles of the Union."

From the viewpoint of medical history, there is a fortunate and fantastic link in this chain of events, by which it is known why General Wadsworth could not apply Webb's criteria to himself. A young physician, Z. Boylston Adams, who had been an assistant surgeon in camp in 1861 and in the Peninsular campaign of 1862, on the morning of Wadsworth's wounding was captain of Co. F, 56th Massachusetts Volunteer Infantry, division of General Thomas G. Stevenson of Burnside's Ninth Corps, participating in the battle of the Wilderness. Adams fell shot in the leg and, after having been alternately in Confederate and Union hands with the ebb and flow of the battle, was carried that night, unconscious, to a field hospital. He awoke the next morning on the ground under an operating table with blood dripping on him and a stray amputated leg at his head. Doctors Miner and Gaston, of Mahone's Brigade, A. P. Hill's Corps of the Confederate army, both of whom he says smelled pretty strongly of whiskey, later resected five inches of his fibula. When he regained consciousness from his chloroform anesthetic, he found himself on the ground

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under a tent fly beside a Union officer who had a star on his shoulder. But let Doctor Adams tell his story:<sup>6</sup>

"His face was familiar. Raising myself upon my elbow I spoke to him, but he made no reply. I looked closely at him and recognized the man who rode up to us on the Plank Road the day before, when my brigade was put into the battle as already described. He was rather tall, an eminently handsome man of commanding presence, but showing gently breeding. I lifted his eyelids, but there was 'no speculation in those eyes.' I felt his pulse, which was going regularly. His breathing was a little labored. There was no expression of pain, but occasionally a deep sigh. His noble features were calm and natural, except that his mouth was drawn down at the left side. His right arm was evidently paralyzed, which indicated that the injury was to the left brain. Examining further, I found that a musket ball had entered the top of his head a little to the left of the median line. In his left hand, which lay quietly upon the breast of his buttoned coat, he held a scrap of paper, on which was written, 'General James S. Wadsworth.' . . .

"The surgeons came Saturday night and examined General Wadsworth's wound, removing a piece of the skull, and then probing for the ball; (the latter struck me as bad surgery). One remarkable thing about the case was that the ball had entered near the top of the head, had gone forward, and was lodged in the anterior lobe of the left side of the brain. One can only conjecture how such a wound was received, but I have since learned that his horse was shot and fell with him, and it may have been that he was hit as he fell forward, or bent forward his head in anticipation of a volley from the advancing enemy. He seemed to be unable to swallow, for if more than a teaspoonful was put into his lips it ran out of the corners of his mouth upon his beard. Occasionally he heaved a deep sigh, but otherwise lay in calm slumber. On Sunday the 8th, he became comatose, with rising and falling respiration, and ceased to breathe finally at near two PM

having lived about forty-eight hours since his wounding. . . . I cut a lock of hair from his head which I brought home with me and gave to Mrs. Wadsworth in Boston. When I cut off this lock of hair I felt that it might be the only relic preserved of this noble patriot, gentleman and soldier. . . .

Doctor Adams described the incredulity of the rebel officers that the dying general was the nationally known Wadsworth, the burial of the body by a Virginian, Patrick McCracken, whom Wadsworth had befriended, and its subsequent recovery by a Union officer under a flag of truce. Of his own later experiences at the Wilderness, Adams wrote:

"After the death of General Wadsworth I was removed to another part of the field, where I lay without shelter and almost without notice among the many hundreds of wounded collected at this place. Of what happened about me during the ten or eleven days that I lay on this part of the Wilderness battlefield, I have but a vague remembrance. It seems like a horrid nightmare. The groans and complaints of the wounded sufferers, the foul stench, the tormenting gnats and flies, the pain and fever, thirst, vomiting and diarrhoea, the sense of loneliness and abandonment, every one around me being utter strangers, the back raw from lying on the ground, the hot sun against which the scanty foliage of the low trees afforded little protection, the maggots which got into my wounds—how can I tell all the horror of that time! My leg had been too tightly bandaged, and the wound sloughed and became offensive. I could not keep down my food. The surgeons came once a day. Water was scarce."

Among the rebel officers mentioned by Adams as visiting the little tent was, no doubt, young Surgeon Welch, of the Thirtieth South Carolina Volunteers, who wrote to his wife after visiting the wounded of his regiment on the afternoon of May 6th: "Not far from these was an old man, a Yankee officer, mortally wounded. I learned that he was Brigadier-General Wadsworth, once Governor of New York."

Doctor Adams' prediction that the lock of hair he preserved from Wadsworth would be the only memento was nearly, but not quite, correct. The general's watch, sword, and glasses disappeared, but Sorrel, chief-of-staff in Longstreet's corps, recovered his map and, many years later, returned it to Congressman Wadsworth, son of the general with appropriate ceremony.<sup>8</sup>

Wadsworth, aged 56, had read law with Daniel Webster and was not a military man by training. Nevertheless, he was an inspiring leader who had used influences to get transferred from Washington to a field command. His bravery and gallantry in combat are well documented.<sup>9</sup> Shortly before he fell, he had ordered his son, Craig, back to his command for remonstrating about his father's recklessness. Posthumously he was brevetted major general, to date from the day of his wounding, for gallantry in the battles of Gettysburg and the Wilderness.

General Webb had a slow convalescence, being disabled for eight months. His head wound did not, apparently, impair his mental activity. He did not again hold command, although he carried heavy responsibility.<sup>10</sup> As chief-of-staff to Meade, who then commanded the Army of the Potomac, he finished the war in the field, a brevet major general, U. S. Army. Graduating from the Academy at West Point, class of 1855, he was, when the war began, about 28 years old and a second lieutenant of artillery, assigned as assistant professor of mathematics at the Military Academy, after having served on frontier duty in Florida and Minnesota. In 1866 he was reassigned to the Academy as principal assistant professor of geography, history, and ethics. At this time his rank in the Army was lieutenant-colonel. He was honorably discharged in 1870 at his own request. In 1891 he was awarded the Medal of Honor for distinctive personal gallantry in the battle of Gettysburg.<sup>11</sup>

The mystery remains why Doctor Adams

left the medical corps and was serving as a line officer. His powers of vivid clinical description were, fortunately, not lost and their product lives in our historical record.

Today's readers are surprised by battle casualties so high that general officers should personally have seen enough of any variety, such as head wounds, to have formed an opinion on their prognosis. Nevertheless, such was the mortality and bitterness of that war. The primitive state of surgical care less than a hundred years ago, the inadequate provision for the wounded as late as the fourth year of that war, and the hardships that our ancestors were willing to endure for their ideals are epitomized by the stories of these three men.

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# Fat Embolism of the Brain; Mechanism of

By

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**A**LTHOUGH fat embolism of the brain following fractures has long been recognized, the manner in which the fat globules reach the brain has been the subject of much speculation and several interesting theories. It seems obvious that globules of fat large enough to lodge in the arterial circulation of the brain or kidney cannot pass through the capillaries of the lungs. Boyd<sup>1</sup> outlines theories based upon hypothetical changes in the physicochemical state of normal blood fats with loss of emulsification as the result of trauma.

I have never been able to accept any of the various theories, and, about 25 years ago, I performed an autopsy which gave me what I am convinced is the key to the problem.

A young man sustained a Pott's fracture which was put in a cast for about 6 weeks. Shortly after removal of the cast he developed a relatively minor pulmonary embolism followed in an hour or so by sudden paralysis and then died. At autopsy I found a patent foramen ovale about 5 mm. in diameter. Hanging in the foramen was a clot about 3 mm. in diameter and about 3 cm. long. Several similar emboli were found in the various cerebral arteries.

Some time later I performed an autopsy on an older man who clinically died of an acute coronary occlusion under similar circumstances. He also had a shower of small pulmonary emboli, a fully patent foramen ovale and an embolus about 2 mm. in diameter firmly wedged in the orifice of the left coronary artery.

In my nearly 8 years in Coroner's work I performed more than 13,000 autopsies. For the greater part of that time my Chief and I

worked in the same autopsy room and performed about the same number of autopsies. When either of us encountered anything unusual it was immediately brought to the attention of the other. On that basis, I believe that I am justified in stating that the experience of each of us covered approximately 26,000 autopsies. I estimate my other personal autopsies at something over 3,000.

From the first experience outlined above I kept count for about a year of *all* cases of patent foramen ovale which I encountered and found some degree of actual patency to be present in about 35%. This checks closely with the figures given by Paul Dudley White in his book HEART DISEASE.

Since the first case outlined above I have not performed an autopsy on a case of embolism of the arterial system by fat or other emboli from the venous system in which the foramen ovale was not, to some degree, patent. I do not know why I have never before written this up.

In view of the foregoing, it seems that the various theories as to the mechanism of fat embolism are superfluous. I am convinced that a patent foramen ovale is the portal through which emboli of any kind pass from the venous into the arterial side of the circulation. Why not? I have never seen this in the literature. It has apparently been overlooked.

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# Carbon Dioxide Therapy in Psychiatric Patients\*

By

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CARBON dioxide inhalation therapy in the treatment of psychiatric conditions has been used at the Minneapolis Veterans Administration Hospital since the fall of 1951. From September 27, 1951 to June 24, 1955, 227 patients on the psychiatric service were treated with carbon dioxide inhalation therapy, and this report will bring out some of the results of a study of 215 of these cases.

## HISTORY

From a historical standpoint, the use of carbon dioxide in psychiatric conditions was first reported in 1929 by Loevenhart, Lorenz, and Waters<sup>1</sup> who used 30% to 40% carbon dioxide in oxygen in the treatment of psychotic patients. They found that catatonic patients became quite clear mentally with this treatment, but that within a few minutes to half an hour the patients returned to their former state. In 1937 Kerr, Dalton, and Gliebe<sup>2</sup> reported the use of 30% carbon dioxide in oxygen in the treatment of anxiety states with somatic symptoms. Kerr found that hyperventilation would cause the patient's somatic symptoms to recur, and that inhalation of the carbon dioxide-oxygen mixture relieved them. In 1947 Meduna<sup>3,4</sup> reported the use of carbon dioxide therapy in psychoneurotic patients, and in 1948 he reported quite an extensive study of its use in these cases. Since that time he has continued to report his work with carbon dioxide, and many other workers have published the results of their work with this therapeutic agent.

Meduna experimented with various concentrations of carbon dioxide in oxygen, but

early in his work with it he decided that a mixture of 30% carbon dioxide in oxygen was the most satisfactory concentration. He has continued to use this concentration since that time. Meduna's technique provided for the administration of this gas mixture three times a week. The patient was allowed to breathe the mixture until he became unconscious and remained unconscious for two or three seconds. Usually from 17 to 45 respirations were used to achieve this result, but during the course of treatment, the number of respirations was sometimes increased if the patient's progress reached a plateau and improvement ceased. He reported that the number of treatments in successfully treated patients varied from 15 to 150. Also he did not use psychotherapy with his patients given carbon dioxide treatment. Since the originally published descriptions of his technique, Meduna has modified his procedure by using 100% nitrous oxide to induce anesthesia prior to the administration of the carbon dioxide-oxygen mixture. The nitrous oxide was used to avoid the anxiety produced in many patients when carbon dioxide and oxygen alone were used.

A number of modifications of Meduna's technique have been reported and are in use. Moriarty<sup>5</sup> adds 100% carbon dioxide to the 30% carbon dioxide-oxygen mixture to speed up the induction of anesthesia. He also adds psychotherapy along with this treatment. La Verne<sup>6</sup> introduced a "rapid coma technique" using a mixture of 70% to 80% carbon dioxide in oxygen. Jackman<sup>7</sup> has employed carbon dioxide inhalation therapy to produce therapeutic convulsions in depressed patients.

## INDICATIONS AND CONTRAINDICATIONS

Using carbon dioxide therapy, Meduna has reported good results in psychosomatic disorders and psychoneuroses. He has noticed some benefit in stutterers and alco-

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holics, and has had good results in some personality maladjustments. He has stated that this therapy is not of value in psychoses and obsessive-compulsive states.

The *contraindications* to this treatment include severe hypertension, active pulmonary tuberculosis, cardiovascular disease including coronary heart disease, acute allergic respiratory reactions, and advanced emphysema. Psychiatric contraindications would include pre-psychotic states as these conditions have been found to be precipitated into frank psychoses as a result of carbon dioxide treatments.

#### THEORETICAL BASIS

Various theories have been postulated to explain the action of carbon dioxide in this therapy. Lorente de No<sup>8</sup> has shown that on an isolated nerve carbon dioxide raises the membrane potential, increases the threshold of stimulation, increases the ability of the nerve to conduct trains of impulses, and delays the appearance of fatigue in the stimulated nerve. Meduna<sup>9</sup> has postulated that psychoneurotic processes are maintained by continuously reverberating circuits. He assumes a constant reverberation in the feed-back mechanisms in which the output of the system reinforces the input. The impulses which should have been negative feed-backs have become positive feed-backs. By raising the threshold of stimulation of the nerves involved, the pathological positive feed-back is stopped, and the pathological reverberating circuit is broken up. The neurophysiological basis of the neurosis is thus abolished.

Gellhorn<sup>10, 11</sup> postulates a different theory to explain the action of carbon dioxide inhalation therapy. He has shown that in the lightly anesthetized cat 10% carbon dioxide activates the hypothalamic-cortical system, and that 30% to 40% carbon dioxide reduces and finally abolishes the reactivity of the hypothalamic-cortical system. He says that the psychoneurotic seems to be emotionally hyper-reactive. Translated into physiological terms, this statement implies a hyper-excitability of the hypothalamic-cortical system which could be counteracted by carbon di-

oxide of 30% or 40% concentration. Gellhorn concludes that 30% to 40% concentrations of carbon dioxide reduce greatly the excitability of the hypothalamic-cortical system and that this accounts for the anesthetic effect in the normal individual as well as for the reduction of emotional responsiveness in psychoneuroses.

#### METHODOLOGY

The technique of administering carbon dioxide which we have used is essentially the one described by Meduna in his book, "Carbon Dioxide Therapy" published in 1950. A mixture of 30% carbon dioxide in oxygen is used, and no premedication is given. Although Meduna recommends giving 25 breaths the first treatment, we have not done this but give only five or six breaths the first treatment. The number of breaths is increased with each treatment up to 25 to 40 breaths. Twelve breaths are given at the second treatment, 18 are given at the third, and 25 to 28 breaths are given at the fourth treatment. Subsequent treatments are maintained at from about 18 to 35 breaths—just enough to achieve and maintain unconsciousness for about two seconds. After about the fifteenth breath the patient is asked to open or close his eyes, and this command is repeated about every five seconds. When the patient no longer responds to this command he is assumed to be unconscious. Although the goal of each treatment was to achieve a few seconds of unconsciousness, 39% of our patients did not become unconscious. Some patients developed so much muscular twitching that the treatment was stopped before unconsciousness was reached. Other patients became more apprehensive as the number of respirations increased. Some patients seemed to feel better and seemed to get a better result if only 5 or 10 breaths were used at each treatment.

This report deals with 215 patients treated by the above technique. Included in this series are 157 patients with psychoneurosis, 22 with psychophysiological disorders, 34 with personality disorders, and 2 with psychotic disorders diagnosed as simple schizo-

phrenia. Patients were selected on the basis that they appeared to be poor candidates for psychotherapy. Some of these patients were alcoholics, some suffered from hypochondriacal symptoms of long duration, and some seemed unable to verbalize very much significant material. The patients were all male veterans with an age range of from 22 to 59 years and a mean age of 33 years. The number of treatments per patient ranged from one treatment to 26 treatments with a mean of 8.6. If 25 patients with 3 or fewer treatments per patient are omitted from the calculation, the mean would be 9.5 treatments per patient.

All patients were treated in the hospital and participated in the various hospital activities such as occupational therapy, manual arts therapy, recreational therapy, and the like. Some patients attended group therapy sessions. The carbon dioxide treatments were administered by the author or by another member of the staff. The patients were assigned for medical care and psychotherapy to various members of the full time and resident psychiatric staff, and they received individual psychotherapy in interviews—usually two or three times per week.

### RESULTS

The cases were rated in the following manner. The discharge summary of each patient was read, and a determination was made whether or not a favorable response to carbon dioxide had occurred. A favorable response was considered to have oc-

curred if the patient's own therapist made a comment in the discharge summary to the effect that the patient had shown improvement after starting on carbon dioxide treatments, or that the carbon dioxide seemed to relieve some of the symptoms, or that it seemed to facilitate psychotherapy. In quite a few summaries no comment about carbon dioxide was made, and in such cases it was assumed that a favorable response to carbon dioxide did not occur. In a number of cases the therapist reported that the patient's condition was made worse by carbon dioxide.

The findings are tabulated in the accompanying tables. From Table I it can be seen that in 157 patients with psychoneurosis and in 34 patients with personality disorders, the percentage of patients with a favorable response to carbon dioxide was the same, namely 35%. Of 22 patients suffering from psychophysiologic disorders, 63% showed a favorable response. Neither of the two psychotic patients responded favorably to the treatment. Table II reveals that in a small number of cases of anxiety reaction, unqualified, that 60% showed a favorable response. In a larger number of qualified anxiety reactions (anxiety reaction with depression, anxiety reaction with paranoid trends, etc.), only 30% showed a favorable response. In Table III we see that of 83 patients who did not become unconscious with carbon dioxide treatment, only 24.9% responded favorably to the treatment. Of 129 patients who become unconscious during these treatments, 49.6% responded favor-

TABLE I  
RESPONSE OF NOSOLOGIC GROUPS TO CARBON DIOXIDE

Nosologic Group	Number of Cases Treated	Number Showing Favorable Response	Percent Showing Favorable Response
Psychoneurosis	157	55	35%
Psychophysiologic Disorders	22	14	63%
Personality Disorders	34	12	35%
Psychotic Disorders	2	0	0%
Total	215	81	36%

TABLE II  
RESPONSE OF ANXIETY REACTION TYPES TO CARBON DIOXIDE

Type of Anxiety Reaction	Number of Cases Treated	Number Showing Favorable Response	Percent Showing Favorable Responses
Anxiety Reaction (unqualified)	10	6	60%
Anxiety Reaction (qualified, i.e.—“with depression,” “with paranoid trends,” etc.)	90	27	30%
Total	100	33	33%

ably to the treatment. In the second part of Table III we see that of 34 patients who became unconscious with the treatments, but did not dream while under the treatment, only 20% showed a favorable response. Of the patients who became unconscious with the treatments, 95 patients reported that they had some sort of dream while unconscious. Of these 95 patients, 61% showed a favorable response to the treatments.

#### CONCLUSIONS

From our use of carbon dioxide inhalation therapy we have been impressed by the fact that most patients report that they feel relaxed after the treatment. This feeling of relaxation at first lasts only a few hours but after a few more treatments the feeling of relaxation lasts from the time of the treatment in the morning until well into the afternoon. As the number of treatments increases, the period of relaxation increases in

duration until it extends into the day following treatment. We have found that in some patients where progress in psychotherapy is slow, that after carbon dioxide therapy is started, the progress seems easier and more rapid. Not infrequently the dream material reported by some of the patients is closely related to their conflicts. Use of this material in the interviews is often very valuable.

We have an impression that psychoneurotic patients who manifest chiefly unbound free-floating anxiety respond particularly well to carbon dioxide therapy. This impression is confirmed to some extent by the tabulated results. The finding that patients who dream while under treatment respond much more favorably than those who do not dream is the most interesting finding of this study. Why this happens may be due to the fact that the remembered dream material becomes available for the patient to deal with consciously accompanied by abreaction. It

TABLE III  
EFFECT OF UNCONSCIOUSNESS OR DREAMING ON RESPONSE TO CARBON DIOXIDE

Type of Case	Number of Cases Treated	Number Showing Favorable Response	Percent Showing Favorable Response
A. Effect of Becoming Unconscious on Response to Carbon Dioxide			
Cases who did not become unconscious	83	20	24.9%
Cases who became unconscious	129	64	49.6%
B. Effect of Dreaming While Unconscious on Response to Carbon Dioxide			
Cases who became unconscious but did not dream	34	7	20%
Cases who dreamed in addition to becoming unconscious	95	58	61%

may also be due to the fact that remembered dream material is often used in subsequent psychotherapeutic interviews with worthwhile results.

#### SUMMARY

Some historical and theoretical aspects and the methodology of carbon dioxide inhalation therapy have been presented. Two hundred and fifteen patients were treated with a slightly modified Meduna technique of carbon dioxide therapy. Favorable response to the treatment was found in 35% of the psychoneuroses, 63% of the psychophysiological disorders, 35% of the personality disorders, and 0% of the psychotic disorders. Six of ten patients with unqualified anxiety reactions showed a favorable response to the treatment while only 30% of a larger group of patients with qualified anxiety reactions responded favorably. Only 24.9% of patients who did not become unconscious during the treatment responded favorably, whereas 49.6% of cases who became unconscious during the treatments showed a favorable response. Only 20% of the patients who became unconscious during the treatment but did not dream responded favorably, while 61% of the patients who

became unconscious, and in addition dreamed while unconscious, showed a favorable response.

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# The Problem of Tuberculosis in Military Medicine\*

By

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**P**HYSICAL capacity is extremely important in the effectiveness of troops. Transient and relatively innocuous physical defects may be completely disabling, disrupting entirely the scheduled completion of integral portions of training and orientation. The importance of maintaining effectiveness increases with advances of training and reaches its peak when the unit assumes its position in the field.

Therefore, the basic premise in military medicine is: that no disease may be considered benign, no matter how trivial, if that process detracts from efficiency.

Infectious processes in this category are met with stringent and direct approaches. Potentially significant diseases, preventable by vaccination or peculiar to geographical limits, are protected against by appropriate measures.

The purpose of this paper is to discuss those processes of infectious nature, not peculiar to any specific geographical environment, which are insidious in their onset and by these characteristics are more difficult to evaluate. Possibly these conditions are more easily controlled by other means than by direct approach as currently practiced.

Tuberculosis most certainly falls into this latter category, and though adequate X-ray screening procedures will remove most individuals with this disease from units before the institution of training, it does not remove those individuals susceptible to the disease, and it may not remove those without manifest signs of infection. Whether these groups are of large enough size to constitute a real threat to the effectiveness of a unit remains to be seen, but available information would seem to indicate that they are.

The advent of an effective chemotherapeutic approach to the treatment of tuberculosis has not altered the significance of this disease in international importance. Tuberculosis morbidity and mortality reports among civilian populations of the allies, especially those in far eastern nations, are of a magnitude which, when compared to American figures, are difficult to comprehend.

The Armed Forces of the United States are committed to operate in some areas in which the tuberculosis rate can be estimated only roughly, and then it is conservatively estimated in many instances at greater than ten percent. Case finding programs and active treatment in the United States have made tremendous inroads into the problem at home. However, in the Philippines, a similar program reveals the morbidity rate to be nine percent. In spite of financial assistance from the United States to establish methods of controlling the disease,<sup>1</sup> only the beginnings of response can be noted. Facilities for treatment of known cases are decidedly inadequate, and known positive, open cases can be no more than noted and turned out to outpatient management where they frequently serve as further sources of infection. Case finding programs cannot be more effective than the maintenance of definitive therapy programs. The two programs are obviously not on the same plane of effectiveness.

At home, the overall picture has been altered by the ability to produce and use the chemotherapeutic agents, with the trained personnel and physical equipment necessary to isolate and treat at least a large proportion of our known cases. Under these conditions, the statistics indicate a less proportionate change in morbidity reports than in mortality figures. The significance of these points are that, even under the most ideal conditions, tuberculosis continues to be a serious health hazard. Under more adverse

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conditions, it poses a health hazard which may, in fact, be of epidemic proportions. It is, therefore, obvious that a concerted and continued effort must be maintained to protect our people at home by case finding and treatment and to afford the maximum protection to our personnel overseas. It would then appear that from the viewpoint of protection for our armed services overseas that a quite different problem is posed—one that must be handled by a somewhat varied approach. American literature on this problem of tuberculosis control recognizes prevention as an important, though secondary, adjunct. This has worked well and borne fruit. However, in some regions where facilities for active treatment are not comparable to those of the United States, it has been of greater importance to attack the problem by vaccination until such time as treatment of known cases has been completed. The obvious approach is a combination of both these procedures, and this is being accomplished wherever possible.

In an attempt to carry this combined effort a step farther, it has been suggested by competent American investigators that the development of tuberculin allergy during a known period is, in itself, an indication for active chemotherapy. This stand is taken in recent tuberculin conversion without evidence by X-ray or clinical examination to localize an active focus.<sup>2</sup> Waring defends this stand of chemotherapy in these instances by "attacking the disease at its most vulnerable point." In closely controlled and observed groups in which the time of conversion can be accurately placed, this is a most logical approach, the par excellence of medical practice. Unfortunately, however, the close scrutiny necessary for this type of management does not afford itself readily to the practice of military medicine. Indeed, even though this regimen were possible in all cases, the question must be logically raised—is it best to await conversion and then institute chemotherapy, or should further investigative procedures be completed and more accurate screening accomplished prior to the development of this stage of active disease? It seems possible that

a plan can be evoked to alter the incidence of the service individual who is "non-effective" because of tuberculosis by taking the appropriate steps necessary to segregate him, or by raising his resistance to the disease, if this be possible.

The establishment of a Specialized Treatment Center for Tuberculosis at Fort McClellan, Alabama, in March 1953 afforded some opportunity to observe the natural history of tuberculosis in groups of high and low native resistance. This area of the Third Army encompasses the states of Florida, Alabama, Tennessee, Georgia, Mississippi, North Carolina and South Carolina. The

TABLE I  
DEATH RATES FROM TUBERCULOSIS

State	Death Rate	
	Non-white	White
Alabama	46.6	18.3
Florida	45.3	11.9
Tennessee	68.3	27.1
Georgia	46.2	13.3
South Carolina	38.2	09.9
Mississippi	38.6	16.1
North Carolina	42.5	10.1

death rates from tuberculosis in these states according to available data, is shown in Table I.

It is of importance to note that individuals residing in the states that comprise the Third Army Area are chiefly rural peoples, having little contact with urban areas where the known tuberculosis rate is high.

In an attempt to ascertain the number of positive reactors to tuberculin, all men entering on active duty from the Third Army Area and assigned to our hospital were tested with PPD upon assignment. In addition, all personnel were X-rayed at the beginning of duty and each six months thereafter. All negative reactors were retested at six-month intervals. Of this group initially tested, 28.8% were found to be tuberculin negative. 31.5% of all negroid troops assigned were tuberculin negative. Unfortunately, retesting has

been incomplete because of change of station or separation from the service.

Of the states represented in this area, all have non-Caucasian populations which exceed ten percent, and in some instances, the non-Caucasian population outnumber Caucasian.

During this period under study, the Chest Service admitted 272 military personnel with proven tuberculosis, whose entrance upon active duty was from the Third Army Area. Of this group, 34.6% were returned from overseas, though only 19% of the entire group has served in Korea. However, when tabulating the incidence of disease by race, it was shown that of the negroid admissions

TABLE II  
EXTENT OF DISEASE BY RACE

Extent of Disease	Negro		Caucasian	
	Total	Per Cent	Total	Per Cent
Pleural Effusion	21	24	37	20
Minimal	12	13.5	60	32
Moderately Advanced	22	25	63	34
Far Advanced	11	13	15	08.1
Lymph Node	13	14.9	05	02.7
Other	08	09	05	02.7

returned from overseas assignments, 56% had served in Korea. A further breakdown of the extent of disease by races is shown in Table II.

Tuberculosis in the non-Caucasian group, regardless of the extent of the process, was more explosive in its manifestations, and 52% of negroid troops diagnosed had greater than minimal disease in contrast to all non-negroid troops in which 44% had greater than minimal. Pleural effusion followed a more protracted course in non-Caucasian individuals. Parenchymal disease was primarily of the acute, reversible exudative form. In all instances, the response to combined intermittent chemotherapy was satisfactory.

No tuberculin studies were known prior to hospital admission of any of these men, and though this constitutes an important lack

of information, the predominant type of disease indicates an initial infection with the tubercle bacillus. 34% of these men served overseas—19% of them in Korea. Notwithstanding the geographical position of their service, it seems logical to suppose that a young man racially susceptible to tuberculosis, who enters upon active duty from an area where he has had little or no contact with the disease, and who is possibly anergic to tuberculin on entrance, may contract the illness with greater ease if he is exposed to it. This man undergoes the rigors of basic training and lives in a barracks with at least thirty other men. If he maintains a close contact with an active, open case of tuberculosis, he is most certainly prone to develop it. If he is fortunate enough to avoid the potential infection, completes his training and is sent overseas to an area where one out of every ten individuals has tuberculosis, the risk is obviously greater. The risk is much more than that to the individual alone—it entails a problem of non-effectiveness, of expenditure in training, of evacuation, hospitalization and temporary or permanent retirement.

It constitutes a special problem from the military preventive medical viewpoint. The course of events cannot be circumvented by observing for tuberculin conversion and institution of treatment. Something more is needed. Admittedly, no conclusions may be drawn from impressions and but feeble ones from small studies; however, it is not the purpose of this report to attempt either. It may be, however, that a pilot study would allow some conclusions to be drawn by the tuberculin testing of men entering on active duty from rural areas or who are known to have diminished native resistance to tuberculosis. Indeed, this may be the opportunity to more closely utilize an adjuvant method of control by combining immunization of susceptible individuals and active treatment of established disease. Obviously, no recommendations concerning immunization can be made without first ascertaining if the incidence of disease is appreciably greater in individuals serving in native endemic areas. The point of resistance to tuberculosis has

provoked discussions throughout the years. Two facts have become established, however; namely, that in the broad sense, resistance is of either native or acquired form. The difference between rates of tuberculin allergy and tuberculosis deaths attributes to the latter.

B.C.G. might, in fact, further lower the incidence of disease in our overseas personnel. The efficacy of the agent has been accepted with enthusiasm in Europe. It has been sporadically accepted in the United States. Its proponents are enthusiastic, and its opponents are equally energetic in their views. At present, a main deterrent to its use would be the destruction of the tuberculin test as a means of ascertaining conversion due to disease. Thus, the institution of therapy in conversion could not be judged. However, if pilot studies would reveal that the incidence of frank disease were noticeably diminished, then a real gain in control of the disease would be realized.

It is now accepted that the injection of the living bacillus does provoke an increase in the degree of resistance of its host to the disease.

It is not our purpose to attempt to discuss the various ramifications or mode of this action. The establishment of resistance is a relative thing which, in the case of tuberculosis, does not carry the same promise as in diphtheria or other bacterial diseases. However, the elevation of resistance to higher levels appears to be a practical supposition. In a fine, brief review on the subject, Long<sup>4</sup> presents the evidence that B.C.G., "when properly prepared and administered, is harmless and that on the basis of studies reported in the literature, an appreciable reduction in the incidence of clinical tuberculosis may be anticipated."

The Military Services present an unusual opportunity to evaluate this procedure. The value derived from its use to further decrease the incidence of disease in overseas personnel and thereby increasing effectiveness of troops in areas of high tuberculosis morbidity is certainly justification to consider its use.

The efficacy of B.C.G. in military medicine is not a point for investigation. In 1951, a study by Dahlstrom and Difs<sup>5</sup> among 60,000 conscripts of the Swedish Army revealed rates of tuberculosis of 4.61 in vaccinated groups and 12.48 in non-vaccinated individuals. Similar experiences among civilian populations in Japan where the death rate due to tuberculosis in 1945 was 282.2 per 100,000<sup>6</sup> was decreased to 82.1 per 100,000 in 1952 due in great part to the use of B.C.G.

It is admittedly true that elevation of the standard of living alone will precipitate a decrease in the incidence of tuberculosis. This is not valid reasoning in the case of American servicemen, for men entering from some rural areas in the Third Army, with negative tuberculin, enjoy a better standard of living than experienced in civilian life.

The establishment of tuberculin testing upon entrance on active duty with follow-up studies to determine the incidence of clinical disease or tuberculin conversion would prove the necessity or non-necessity for further protection of military personnel who are susceptible to tuberculosis.

#### SUMMARY

In one year of operation, 272 admissions of men from the Third Army Area were admitted for active tuberculous disease. 34.6% were returned from overseas, and 19% from Korea.

Tuberculin studies prior to active duty are not available.

There appears significant evidence in an admittedly small series that this infection arose as a result of an initial encounter with the tubercle bacillus in groups or races with great susceptibility.

A study to determine tuberculin allergy of men entering on active duty with follow-up studies to ascertain the incidence of clinical disease is to be desired.

B.C.G. remains a powerful adjuvant to control of tuberculosis which, as yet, has been unused in American Military preventive medicine.

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## LAST CLASS OF OCCUPATIONAL THERAPISTS

WALTER REED ARMY MEDICAL CENTER



U. S. Army Photo

Shown with Col. Harriet S. Lee, Chief, Army Medical Specialist Corps (extreme right), and Lt. Col. Myra L. McDaniel, Chief, Occupational Therapy Section, AMSC, are: (L to R) Lts. Eugenie Fisher, Danessa V. Wise, Lorraine R. Lively, Pauline H. Stephan, and Martha L. Shivers.



# Papaverine Hydrochloride in Status Epilepticus

By

LOTHAR WIRTH, M.D.

IN AN earlier communication it was reported that one grain of papaverine hydrochloride injected intravenously terminated status epilepticus on all four occasions in which it was used.<sup>1</sup> These observations strengthen the belief that spasm of intracranial vessels are causally related to convulsions. Papaverine hydrochloride was selected not only as a potent vasodilator but equally as much for its assured safety margin. In clinical use since 1914, unpleasant side-effects, on rapid intravenous injection of maximal dosage had been observed, but fatalities had not been recorded. A definite contraindication to its intravenous administration, however, is complete auriculoventricular heart block.<sup>2</sup>

Lately a warning to the intravenous administration of papaverine hydrochloride was sounded by Sagall et al., with the report of two deaths as a result of the use of this drug by the intravenous route.<sup>3</sup> One patient was an eighty year old man who had received one grain of this drug for an embolus to the bifurcation of the aorta, the other one a sixty-one year old woman to whom a half grain had been given intravenously for pulmonary embolus. In an appraisal of this situation it becomes clear that in order to obtain local vasodilatation only, a general vasodilator was injected rapidly, adding to a state of shock which commonly accompanies vascular accidents.

In the convulsive state there exists not only spasm of intracranial vessels but also spasm of many smooth muscles throughout the body. Here a relaxation, rather than a dilatation, of those spastic elements is desirable. I, therefore, decided to inject only one-eighth grain of papaverine intravenously in all the cases of status epilepticus which subsequently came under my care. This minute dose should guarantee greater safety besides.

There were eight instances of status epilepticus where I injected one-eighth of a grain of papaverine hydrochloride ( $\frac{1}{8}$  cc), rapidly, because of its small amount, with the desired result. In all eight cases the seizures stopped within 15 to 20 seconds. In observing the patient, first a temporary apnea occurred, then slight flushing of the face, at times accompanied by gagging, and then suddenly relaxation of the previously involved muscles, then postconvulsive sleep.

82 Broadway

Rensselaer, N.Y.

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# Refined Sugar: Its Relation to Dental Caries\*

By

MAJOR ROBERT J. FANNING, D.C.†

IT IS the purpose of this paper to sift out fact from myth in the relationship of refined carbohydrates to dental caries, which is one of the major areas of concern to the dental profession.

Since dental caries is one of the most widespread of human diseases, a tremendous amount of research has been instituted to determine the cause and to effect a cure. The results up to the present time have been somewhat conflicting. Let us consider some of the basic means of caries control. Dental caries can be controlled by decreasing the forces which tend to cause caries or by increasing the resistance of the tooth to the attacking forces. We all know that there are many examples of methods which fall into both categories. For example, the reduction of carbohydrates in the diet may decrease the attacking forces, while the topical application of fluoride solution to the teeth may increase tooth resistance.

## ETIOLOGY OF CARIES

In general, there are two schools of thought regarding the initiation of caries. There are some who believe that local factors are entirely, or at any rate, chiefly responsible. Caries begins on the surface of the tooth. First, we notice an attachment of threadlike organisms to the surface of the tooth. As these microorganisms increase in density, we have what is termed a "plaque." The plaque is the habitat of the oral bacteria. In other words, it becomes a microuniverse populated by a kind of mixed bacterial colony, all living together.

The microorganisms in this plaque utilize the same foods as humans. Carbohydrate gets into the plaque, and the enzymes of the microbial flora break the carbohydrate sub-

stances down to acid. This is the acid involved in the caries process. It is simply an accidental relationship that the products of these organisms lead to a destructive reaction on the human tooth.<sup>1, 2, 3, 4, 5</sup>

In 1936 it was suggested that the mechanism whereby acids are formed in the mouth from carbohydrate material was identical to the anaerobic degradation of carbohydrate in muscle tissue.<sup>6</sup> Furthermore, it was subsequently shown that bacterial metabolism involved the same types of reaction.<sup>1, 7, 8, 9</sup> In view of the foregoing, it was not surprising that the intermediate products of anaerobic degradation of glucose were isolated from fermenting saliva glucose mixtures with no extraneous bacteria present.<sup>10</sup> It was also found at this time that a predominant difference between saliva from caries-free individuals and from caries-active individuals was the rate at which these acids would form.<sup>11</sup>

The actual rate of acid formation of the mouth was not determined until later when Stephan demonstrated that the reactions were extremely fast and analogous to that which occurs in muscle tissue during the anaerobic phase of the carbohydrate metabolism.<sup>12</sup> It was found that when sugar is placed in caries-susceptible areas in the mouth, it is immediately degraded to lactic acid and other acids and that if the area is isolated from the neutralizing effects of saliva, pH values as low as 4 can be obtained in as short a time as three minutes.<sup>13</sup> Furthermore, it was shown that the speed with which acids are formed in isolated areas in the mouth varies from individual to individual and also varies within the same mouth. In the mouths of immune individuals, the production of acid is extremely slow, while in susceptible individuals, the production of acid in carious lesions of the interproximal spaces, pits, and fissures is extremely fast.

\* From Medical Bulletin, U. S. Army, Europe, December 1955. Reprinted by permission.

† From the U. S. Army Hospital, Heidelberg, APO 403, U. S. Army.

Many investigators have shown that under ordinary conditions the saliva is a highly buffered mixture which will neutralize relatively large quantities of acids. Furthermore, the acid neutralizing power of the saliva is dependent to a large extent on the diet and the state of nutrition of the individual.<sup>14, 15</sup> From a chemical point of view, the foregoing immediately suggests that there is a competition going on in the mouth between the rate at which acids are formed and the rate at which they are neutralized. Thus, if acids are formed rapidly from ingested carbohydrates, they may or may not attack the teeth, depending upon the rate at which they are neutralized. If they are neutralized before sufficient time has elapsed for dissolution of the teeth to take place, then a carious lesion will not develop. On the other hand, if they are not neutralized or only slowly neutralized, then a carious lesion will form.

When this acid is produced in the plaque and not neutralized by buffer action of saliva, it dissolves out enough calcium salts from the tooth to neutralize itself. Then the process stops for a while. The organisms have utilized their food and secreted their metabolic products. Now all they do is wait until such time as a person takes another coke or bubble gum or anything else that they may use to produce more acid, and this process repeats and repeats itself, as a result, caries penetrates deeper and deeper until it finally reaches the dentino-enamel junction.

At the dentino-enamel junction we have more organic than inorganic material, and so when the carious process comes to this point it spreads out along this junction, and both proteolytic bacteria and acid-forming organisms produce the next stage of the carious process.

The other view of the origin of caries is that while caries is a local action and always begins at the exterior of the tooth, it is the structure of the tooth which determines whether or not decay will occur. An excellent nutritive condition of the individual is responsible for perfection of the structure, and since the formation of teeth begins in fetal

life, the food of the mother is just as important as that of the child. Vitamins A, C, and D and the elements Ca and P, with traces of Fl, are all considered essential for the building of healthy teeth.

Since acidogenic bacteria of the mouth require a carbohydrate substrate if they are to produce significant amounts of acid, theoretically, at least, it is apparent that acid production in the mouth can be prevented by the exclusion of fermentable carbohydrates from the diet. However, this is merely an abstract consideration since the refined carbohydrates, such as sucrose, glucose, and cereal starches (which are fermented rapidly by salivary bacteria), make up a major portion of our modern diet, and it is not practical to suggest their elimination.<sup>16</sup> Sugar, the "seductive poison" condemned by Pierre Fauchard\* two centuries ago, still delights us.

Several studies have been made which show low incidence of dental caries in persons who are malnourished or on sugar-restricted diets. A study of starving native Albanians revealed low caries incidence.<sup>17</sup> Cady found a relatively low incidence of caries in malnourished Dutch children residing in Coventry, England.<sup>18</sup> These findings are comparable to those of Day,<sup>19</sup> Friel,<sup>20</sup> and others.<sup>17, 21</sup> Bacteria require nourishment, and carious process was arrested in these situations. These findings serve to illustrate that good nutritional status is not so important to the erupted teeth as it is to many other organs.

Boyd showed that the caries rate in a group of 55 diabetic adolescents on restricted diabetic diets was reduced approximately one half of the predicted increment for the average boy or girl in the same age group.<sup>22</sup> In conjunction with the studies of the Italian Medical Nutrition Mission, Schour and Massler examined 3,905 persons in postwar Italy who were malnourished, had a high percentage of rickets and rarely practiced oral hygiene.<sup>23</sup> These researchers found a caries prevalence from 2 to 7 times lower

\* Pierre Fauchard, French dentist, 1678-1761.

than that observed in the study by Boyd. The Italian diet, according to these two authors, is predominately carbohydrate, consisting largely of spaghetti, macaroni and bread. The Italian's intake of refined sugars, however, is low. The Italian study further indicated that the majority of the persons examined showed clinical signs of vitamin B deficiency. It is explained that the high incidence of clinical signs of vitamin B deficiency may be in part the result of the high carbohydrate diet. Such a dietary program requires more than the average amount of vitamin B complex for the carbohydrate metabolism. Dreizen and others have also pointed out that the vitamin B complex is essential for the complete degradation of the carbohydrates to acid end-products, and that the absence of nicotinic acid and thiamin may inhibit acid production in the mouth.<sup>24</sup>

The findings of Schour and Massler in

their Italian studies support strongly the contention that a low-sugar diet is effective in the control of dental caries.<sup>25</sup> They further confirm the statement of Jay<sup>25</sup> and Schweigert and others<sup>26</sup> that many people may eat liberal amounts of starchy foods and yet remain relatively free from dental caries provided the intake of refined sugar is low.

There are many ways of consuming a rather large intake of sugar even though candies are eaten rarely. Some individuals believe that the restriction of candies, possibly syrups, and coke is sufficient. However, there are many other sources of sugars, as may be noted from the table prepared by Hoffman of the Iowa State Department of Health (Table 1).

Recently, the availability and use of commercially prepared food products, most of which are potentially destructive to the

TABLE 1. CARBOHYDRATES EVALUATION  
(The approximate refined carbohydrate content of popular foods expressed in amounts equivalent to teaspoonfuls of sugar\*)

Items	Amounts	in Sugar Equivalents
Hershey bar	61 Gm. (5 cent size)	7 tsp.
Butterscotch	5 Gm. 1" × 1"	1 tsp.
Chewing gum	1 cent stick	½ tsp.
Lifesaver	1 usual size	⅓ tsp.
Jam	20 Gm. 1 level tbsp. or 1 heaping tsp.	3 tsp.
Syrup, maple	20 Gm. 1 level tbsp. or 1 heaping tsp.	2½ tsp.
Honey	20 Gm. 1 level tbsp. or 1 heaping tsp.	3 tsp.
Angel cake	45 Gm. 1 piece (½ of large cake)	6 tsp.
Chocolate cake	100 Gm. 2 layer, icing (½ cake)	15 tsp.
Doughnut plain	40 Gm. 3" diameter	4 tsp.
Brown Betty	130 Gm. ½ cup	9 tsp.
Ice Cream	⅔ quart	5 to 6 tsp.
Apple pie	⅓ of medium pie	12 tsp.
Cherry pie	⅓ of medium pie	14 tsp.
Chocolate, all milk	1 cup, 5 oz. milk	6 tsp.
Coca-Cola	180 Gm. 1 bottle, 6 oz.	4½ tsp.
Gingerale	180 Gm. 6 oz. glass	3½ tsp.
Prunes, stewed (sweetened)	100 Gm. 4 to 5 medium, 2 tbsp juice	8 tsp.
Raisins	30 Gm. ¼ cup	4 tsp.
Orange juice	100 Gm. ½ cup scant	2 tsp.
Grapefruit juice (unsweetened)	100 Gm. ½ cup scant	2½ tsp.
Grape juice, commercial	100 Gm. ½ cup scant	3½ tsp.

100 grams sugar = 20 teaspoons = ½ cup = 3½ ounces = 400 calories.

Candy runs from 75 per cent to 85 per cent sugar. Popular candy bars are likely to weigh from 1 ounce to 5 ounces and may contain from 5 to 20 teaspoons of sugar.

\* From the Iowa Dental Bulletin, April 1947.

teeth, has increased. This has made it more difficult than ever to make widespread gains against dental caries by reducing carbohydrate consumption.

#### DIETS FOR CONTROL OF CARIES

With the work of many investigators in mind, the University of Michigan devised a plan whereby caries can be controlled materially by the patient either by avoiding foods, confections, or beverages containing sugar or by going on a restricted carbohydrate diet for a reasonably short period of time, say for about seven weeks. During the first four weeks the patient does not have sugar in any form, be it candy, honey, syrup, jelly, cookies, fruit or even soda pop. After this period of time, a minimal amount of sugar is permitted once a day with a meal until the conclusion of the diet period. For the first two weeks the diet is so planned that the carbohydrate intake is low, about 100 Gm. daily. This is compensated for by an abundance of protein to make up an adequate number of calories for the size and the activity of the patient. In children normal health and growth are maintained on this diet plan. In both children and adults a slight loss in weight may occur in some cases. In selecting the diet plan, due consideration must be given to caloric intake. The following recommendations\* are made:

Adults		
Female		2,000 to 3,000 calories
Pregnancy		2,400 calories
Nursing		3,000 calories
Male		2,500 to 4,500 calories
Children (13 to 20 years)		
Female	16-20 years	2,400 calories
	13-15 years	2,600 calories
Male	16-20 years	3,800 calories
	13-15 years	3,200 calories
Children Under 13 years		
	10-12 years	2,500 calories
	7-9 years	2,000 calories
	4-6 years	1,600 calories
	1-3 years	1,200 calories

\* National Research Council Report on Nutrition, 1948.

A dietary regimen specifically intended to reduce the number of lactobacilli in the mouth has been worked out in great detail, and the following is a specimen page taken from the dietary prepared by Philip Jay and Adelia M. Beeuwkes of the University of Michigan:

#### Low CHO Diet—Diet Plan 1

This diet contains approximately 140 Gm. protein, 220 Gm. fat and 120 Gm. CHO. It yields approximately 3,000 calories. It is planned for the use of a moderately active man or a very active woman. The diet meets the recommendations of the National Research Council for these groups.

#### TOTAL DAILY FOOD INTAKE

- 1 qt. whole milk
- \* 2 eggs
- \* 3 strips bacon (7" × 1½")
- \* 9 oz. meat, fish or fowl
- 1 cup puffed rice or puffed wheat (for bulk)
- 1½ cups 20 per cent cream (coffee cream)
- \* 5 tbsp. butter or fortified margarine
- 7 servings of fruit and vegetables

\* If larger servings of the foods marked with an asterisk are eaten, the diet will be increased in its protein, fat and caloric content. However the carbohydrate content of the diet will not be altered.

The choice of fruits and vegetables should not include more than 1 serving of 12 percent and 1 serving of 15 percent CHO content in one day. During the first 2-week period (on Diet Plan 1) none of the foods classified in the 18 percent and 21 percent carbohydrate groups should be included in the diet. Consult list of fruits and vegetables classified according to their carbohydrate content.

One serving of fruits or vegetables consists of ½ cup cooked or ¾ cup raw.

#### SAMPLE MENU

##### Breakfast

- ½ grapefruit
- 2 fried eggs
- 3 strips bacon
- 1 cup puffed wheat
- 1 cup 20 per cent cream
- 1 glass milk



*Lunch*

- 4 oz. broiled fish
- 1 serving asparagus
- 1 serving watermelon
- 1 glass milk

*Dinner*

- 5 oz. roast chicken
- Lettuce and tomato salad
- 1 serving peas
- 1 serving carrots
- 1 serving fresh strawberries
- ½ cup 20 per cent cream (part on peas, remainder on berries)
- 1 glass milk

NOTE: One glass of milk is to be taken midmorning, midafternoon or during the evening. Five tablespoons of butter or fortified margarine are to be used in food preparations.

After two weeks on Diet Plan 1, the patient is placed on Diet Plan 2, which is less rigorous than the former, in that it includes a maximum of 6 slices of bread daily, a medium-sized potato and fruits and vegetables (of the kind permitted in Diet Plan 1, which is a water-packed rather than a syrup-packed variety) in greater amount. After two weeks on this plan, if the number of lactobacilli is significantly reduced, the patient is placed on Diet Plan 3, which is like Diet Plan 2 except for one thing—a maximum of 1 teaspoonful of sugar or its equivalent is allowed with one meal during the day.

After two weeks on Diet Plan 3, another sample of saliva is examined for a lactobacillus count. If the count remains low, the patient may return to his usual diet. The diet need no longer be restricted with regard to sugar, but a low sugar intake is nevertheless desirable. Periodic checkups by means of lactobacillus counts should then be planned in order to head off any incipient caries activity. It is believed that once the lactobacillus count has been reduced and reasonable restraint is exercised in the consumption of refined carbohydrate, the count will remain low and caries activity will be reduced for a period of from six months to two years.

While no serious contraindications to this

diet plan have been observed, some patients are likely to lose weight and feel hungry on this regimen. Special consideration should therefore be given children who are underweight. Also because the diet contains relatively little roughage, there is a tendency toward constipation, which can be corrected readily by a suitable laxative.

This restricted diet is intended to reduce the lactobacilli to so small a number as to be negligible so far as causing dental caries is concerned.

No patient should be placed on a restricted diet unless he is intelligent enough to cooperate, is willing to adhere to the diet, and unless a lactobacillus count is done beforehand to determine whether such a diet is indicated. In a small number of cases the count is low despite caries prevalence, and a restricted diet would probably not be of any benefit. Also, lactobacillus counts should be done from time to time to determine whether the patient is to remain on a certain diet plan or be moved to another. The counts also serve as a check on the patient's cooperation in adhering to a prescribed diet plan.

When patients have observed a restricted carbohydrate dietary regimen, a reduction in the lactobacillus counts and in the number of cavities may be expected even in cases in which rampant caries had been present before treatment was begun.

It might be mentioned here that the restriction of food intake to 3 meals a day and no snacks between meals may also lessen the predisposition to caries attack by keeping at a minimum the number of times the carious process, which is an intermittent phenomenon, can become operative. Volker<sup>16</sup> has simplified the dietary recommendations as follows:

1. Reduce refined carbohydrates to a minimum.
2. *Can't Have:* Cakes, pies, pastry, cooked cereals, white bread, preserved fruit, flavored drinks, ice cream, creamed foods, candy.
3. *Can Have:* Meat, fish, poultry, dairy products, fruit, vegetables, dark bread.

While these recommendations aim for the same result—reduction of lactobacilli by means of a restricted carbohydrate diet—a detailed regimen prescribed by the dentist in a form that can be followed day by day is more likely to be observed by the patient who will not conform to a strict dietary regimen for a period of 7 (or more) weeks, Volker's recommendations have this advantage, that in more or less modified form they are likely to be followed over a longer period of time.

If confections are completely interdicted, children are likely to consume candy or chocolate surreptitiously. Therefore, it is better to substitute sugarless candy such as is used for diabetics. Or, if regular candy is consumed at all, it should not be eaten between meals but may be eaten at bedtime, immediately preceding brushing of the teeth when it is likely to do the least harm.

#### SUMMARY

While the reduction in refined sugars and CHO's is strongly recommended and while it may be concluded that dental caries can virtually be eliminated by this procedure, one cannot entirely dismiss other contributing factors, such as heredity.

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## An Army Hospital in Germany\*

**I**N MANY Army mess halls all over the world, there hangs a poster near the serving line, picturing a soldier crawling under barbed wire while over his head in bold letters is the phrase, "An Army travels on its stomach." Although this poster deals directly with food, and more specifically with a well fed soldier and thereby a better fighting man, it infringes upon a problem that has been with every fighting force since time began—morale.

Food effects morale and so does worry. It is not possible to judge which has the greatest effect on the individual soldier. To discuss whether a soldier is less effective when he is hungry or less effective when he is worried would only be the beginning of an endless controversy.

In today's peacetime, combat-ready Army, morale and all its facets play an important role. A soldier who doesn't feel well physically, a soldier worried about his wife who will soon have her first baby, a soldier thinking about the care that's needed for his child who is suffering from an intestinal disorder will not devote all his mental powers to his job and his job today of guarding the outposts of freedom is probably one of the most important duties of our time.

In a cream stucco, red roofed, rambling building on a shady street in the Schwabing areas of Munich, Germany, one answer to a soldiers problem is in action daily. Here under the guiding hand of a graying, intensely devoted doctor, Colonel Thomas E. Patton, Jr., of Rotan, Texas, operates the U. S. Army, 2nd Field Hospital. (Col. Patton is now in office of the Surgeon General.) It is here that a soldier will receive prompt and modern medical care. It is here that his wife will deliver her baby under the most ideal of conditions. It is here that his child will receive the treatment and care which

will make him healthy again. It is here that the worry and mental anguish that a soldier may feel toward the health and medical well being of his family is dissipated.

What type of hospital is this then that provides hospital care and consultation service to U. S. personnel in Southern Bavaria; that admits some 600 patients a month; that handles an average of 200 operations per month; that takes care of 5,000 out-patients in its clinics monthly; that serves 30,000 meals in thirty days and that delivers into the world an average of 75 babies a month?

From the sharply dressed, polite, security guard at its wide front doors to the immaculate, well equipped, operating rooms, the 2nd Field Hospital stands as the protector of the soldiers' health and that of his family.

The average patient, that is one of the 5,000 out-patients who enter each month, is usually directed to the out-patient section, where the case is evaluated and, if specialized care is indicated, is referred to the appropriate clinic. Mothers, unable to leave their children at home while visiting the clinic, are afforded the facilities of a supervised nursery.

As efficiently as the out-patient clinic is handled, so does the emergency room operate. A doctor and trained medical aid man are on duty twenty-four hours a day. Out-side, ever ready, is a shiny new Cadillac ambulance equipped with life saving oxygen, complete first aid equipment, a seasoned driver and a trained technician. Operating together, this becomes a body-saving team, ready and capable of saving life and easing pain.

The soldier who reports to one of the 21 dispensaries within the hospital's areas, and whose case may need further confirmation by a specialist or further treatment not available at the dispensary is sent to the 2nd Field Hospital. From the time he arrives at the hospital to the time he leaves, he is afforded the combined efforts of one of the Army's finest group of specialists. Behind the minds

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and hands of many of the doctors on the staff are years of professional training and experience.

The surgical staff performs their 200 operations monthly in eight immaculate and well equipped operating rooms. With skill, experience, and devotion to their task the doctors, nurses, anesthetists, and operating room technicians go about their daily work. Their badge of humanity is their shapeless, soft green scrub gowns and a quiet air of efficiency. Whether it be a simple appendectomy or an intricate skin graft the results are almost always the same—a healthy soldier soon returning to duty or a wife back to her home and children.

In a quiet sanctum of the Eye, Ear, Nose and Throat Clinic come 800 patients a month, some for simple eye examination, some for normal treatment, others for surgery.

If you were to walk through a certain laboratory door unannounced you would undoubtedly see the face of the radiologist, illuminated by the back light of a screen as he carefully studies an X-ray film. This is the radiology lab where 60 to 70 examinations are made daily. In addition to the X-ray taken at the hospital, the lab also processes those sent in from the 21 dispensaries, providing expert X-ray consultation service for the entire area. The X-ray Chief's most recent love is a new X-ray machine which he describes simply as being able to do everything except make toast and coffee. On the more practical side it will take a picture at faster speeds than most machines and therefore is especially useful for X-ray of children.

It is difficult to think of any hospital without thinking of the "women in white." Army nurses at the 2nd Field Hospital are epitomized by their chief nurse, Major Emma Kaiser of Aberdeen, Md. Probably one of the best known and most liked of all the hospital staff, Major Kaiser has been doing duty in her "best tour" since 1952. As the supervisor of 100 Army nurses, German nurses, medical technicians and ward personnel who care for the patients throughout the hospital, she probably knows the hospital

better than anyone else. In the task of visiting each ward daily and seeing that all services are provided she has the able assistance of M/Sgt. Arthur Valestra of Garden City, New York, the 2nd Field Hospital's non-commissioned officer in charge of Professional Services. Sergeant Valestra sees that each ward has the personnel necessary for the job that is to be done.

Some of the great pride of the 2nd Field Hospital is evidenced by Major Kaiser. Entering the Army Nurse Corps in 1939 she served in England during World War II and later in Hawaii. Her feeling toward the hospital and her insistence that this is the best tour she has ever served is an unmistakable reflection on outstanding accomplishments of the 2nd Field Hospital.

No hospital, military or civilian, seems to fulfill its destiny without babies. The Obstetrical staff is responsible for the delivery of the 75 or more new Americans each month.

Tiny wrists, encircled by identification bracelets are often seen waving frantically or resting peacefully in the maternity ward of the 2nd Field Hospital. While the new arrivals sleep quietly or wail impatiently for feeding time, their mothers sit in a sunlit ward, generously surrounded by flowers supplied from the hospital gardens. First-time mothers gather around an Army health nurse who demonstrates the bathing procedure on a new baby who emphatically wails his protest at being used as a subject for his class.

Under the hospital's careful guidance mothers are usually out of bed two days after delivery and eating their meals in their special dining room on the ward. In most cases they are on their way home five days after delivery.

The 2nd Field Hospital is as close to the troops as the nearest helicopter. Distant or emergency cases are flown to the hospital heliport. In addition a regular hospital train makes a scheduled run to Regensburg, Straubing and Landshut to bring patients to the 2nd Field Hospital. When stateside evacuation or further treatment is indicated

the patients are transported by train and plane to highly specialized medical centers. A medical evacuation plane ever ready for westward movement of an emergency case may be requested by the hospital and obtained at any hour of the day or night.

These and other administrative procedures are the concern of the 2nd Field Hospital Executive Officer, Lt. Col. J. L. LaCombe. Col. LaCombe directs the vast network necessary to keep the records and the administrative wheels of this efficient machine running smoothly.

It was mentioned earlier that many mess-halls carried the poster "An Army travels on its stomach." Appropriately, so does the 2nd Field Hospital. The 30,000 meals prepared monthly in the hospital kitchen is the responsibility of Captain Alice Strong of Norman, Okla., a trained dietician and member of the Women's Medical Specialist Corps.

As mess officer, Captain Strong supervises the preparation of meals, plans the regular menus and the seven to twelve different types of special diets which are served daily.

Menu planning is done two months in advance. Food is procured at the Army commissary and kept in cold storage rooms in the hospital basement. Meals are served in the mess hall and also in the wards by means of electrically heated food carts which are plugged into the ward kitchens and assure that the meal is still hot when it reaches the patient at his bed.

For all patients a variety of facilities and services are available. Within the confines of the hospital area are a post office, post exchange, snack bar, barber shop, theater and library. Full services of the American Red Cross are available under the direction of Misses Oma Smith and Harriet Venus, the Red Cross representatives.

A familiar and welcome sight to bedridden patients are the Gray Ladies, volunteer women from the American community who devote their time and energy to making those long hours of convalescing as pleasant as possible.

German-American friendship flourishes in the 2nd Field Hospital. The building itself was requisitioned by the U. S. Army at the

end of the World War II. In the intervening years half the buildings have been returned to the Germans and that half now operates as a German hospital. Each year the American staff provides a huge birthday cake for the Mother Superior who heads the nursing staff of the German part of the hospital. During the year, on days when the hospital personnel turn out for a formal retreat parade, the black-frocked form of the Mother Superior is seen bustling across the hospital grounds and unlocking the gate which leads from the American side to the German side where the parade grounds is located.

Six miles away from the present hospital building, construction is under way on a new 11 million Deutsche Marks, glass brick and steel structure which will be the new home for the 2nd Field Hospital next year. When the personnel and equipment is moved into the new hospital the present building will be returned to the city of Munich.

The 2nd Field Hospital plays its part also in the combat-ready Army in Europe. Steel helmets, combat boots, and field clothing are placed neatly within reach of each hospital staff member. Personnel are trained to displace to the field and set up three hospitalization units, each capable of operating a 100 bed hospital. Personnel participate in one training problem each month in the field and one overnight problem each quarter.

The 2nd Field Hospital serves today, for the second time on German soil. Activated in 1916 it arrived in France in 1917 to serve with the Big Red One, the 1st Infantry Division. After the Armistice it marched with the 1st Division into Germany. In World War II it earned its battle honors in New Guinea, Leyte, Luzon and the South Philippines. It was awarded the Meritorious Unit Streamer, the Distinguished Unit Citation, and the Philippine Presidential Unit Citation. With a proud heritage, with the satisfaction of a job well done, and with the knowledge that they are prepared to carry on, the officers, men and women of the U. S. Army 2nd Field Hospital stand strong in the knowledge that they, too, play an important part as today's guardians of freedom.



## EDITORIAL

### Vacation Time

**W**E APPROACH the summer season with a feeling of release from the four walls that have hemmed us in during the winter. Not that we have been shut-ins do we feel this new life and anticipated increase in the sphere of our activity, for we have been busily engaged in our daily pursuits in our own way of life. Our jobs somehow seem more important to us during the winter months.

Now we approach the vacation period. There will be more activity around our home; the yard and the flowers demand attention; many jobs on the house call for action, and we increase our daily sphere of activity on the community projects in which we have enlisted. Farther away is that vacation spot we have been dreaming about while "Ole Man Winter" has kept the doors closed.

We have decided to take things just a little slower this year. We remember one neighbor's experience last year. He bought a new car guaranteed to do 100 mph. He was sold on the idea of the 250 horsepower engine. They just did not make a better car. The two-week vacation would let him get pretty far away from the daily drudge. While on his trip he passed another vacationist on the road but to satisfy his ego, our neighbor whipped up his car to 75 mph. He made it but just over the hill top there was a stalled truck that had not put out a warning. The ditch was a life-saver though a car-wrecker. Our neighbor got out of that one with his skin and bones intact. He arrived

at his destination a little shaken and somewhat perturbed. The following day was a sultry one but a beautiful day to play 36 holes of golf. The game did exhaust him a little but a nice swim took care of his feeling of weariness. A seven course dinner preceded by a few cocktails really climaxed the day. The night was a rather hectic one; it had been determined that the cook had not properly taken care of the meat for dinner.

Well, with a few exceptions that was a wonderful two weeks. Our neighbor arrived home just a little exhausted and found the grass six inches high. So he took out the mower and got busy. He would show the fellow next door that his lawn was not the only one in the neighborhood that could look nice. That fellow next door took life mighty easy. He never went any place. All he knew was what he heard over the radio and television, and read in the newspapers. He missed half his life. Why didn't he see the country?

Then my busy neighbor found the work at the office had piled up while he was gone. He just had to catch up. The way to do it was easy. He worked nights, Saturdays, and Sundays. The noon hour gave him a little more time to get some of those papers out of the way, too.

A few weeks after that delightful vacation a pain in his chest floored him. Well, the jitter bug had to go to the hospital. But after a couple of months he returned to his home. The oxygen tent and those new fangled ideas of the doctors pulled him through.

Yes, summer is a wonderful time.

## Around the World

By

CLAUDIUS F. MAYER, M.D.

WEST AFRICA and the other components of the French Union located in Africa have been in a complete turmoil for some time. The idea of nationalism and self-determination permeated these French possessions. The final solution of their troubles will seriously affect the political future of other free nations. Moreover, the outcome of the struggle between *French culture and civilization and African nationalism* is also of great importance to the health affairs of the whole world. The end of March this year saw the recognition of Tunisian independence. The same recognition was also guaranteed to Morocco, West and Central Africa, Madagascar, even to Algeria, though all of them may retain a close tie with France, their former protector. After all, was it not France and the often blamed French "colonialism" that has pulled this part of the world out of the abyss of early 19th century ignorance and poverty? There still remain many health problems for the French to solve, such as the malnutrition of natives, the major endemic diseases prevalent in those subtropical and tropical lands, etc.

*Colonialism and the nutrition of Africans* have been frequent topics of recent discussions held in French medical circles. Special committees were also formed for the medical study of the native food problems in the French African protectorates. At a recent *meeting of the National Academy of Medicine at Paris*, two medical authorities (Prof. C. Richet, and Dr. Reilly) glorified the great achievements that French colonial rule had accomplished throughout its 125 years. Many Africans were saved from death in many ways. Great French sociologists led the world in the campaign for the abolition of open and camouflaged slavery. Commerce in these parts of Africa also developed as a result of colonialism, and by the effort of such colonist pioneers as General Faïdherbe in the Senegal, Monsieur Brazza in the Con-

go, General Gallieni in the Sudan and in Madagascar, and Marshal Lyautey in Morocco.

The medical academicians also pointed out the *great blessings of medicine* that France—and Europe at large—had brought to Africa and to Africans, among others the discovery of Hematozoa, the detection of insect-borne rickettsial and relapsing fevers, the combat against sleeping sickness, etc. Several millions of poor Africans have had their lives saved by European medicine. "Which one of the Arab people who are now fighting the French had ever accomplished anything comparable?"—asked the Parisian doctors, and they are ready to conclude that "*African civilization is the gift of Europe, and of Europe alone.*"

The steady *improvement of North African nutrition* also should be ascribed to the efforts of France. A few decades ago, Algerians, Tunisians, and Moroccans were starving to death. It was not the rich, the upper ten percent of the people, but the poor, the 90% of the population who mostly suffered from famine. France has always been working for the welfare of the poor, says Prof. Richet. Yet, much is still left for humanitarian France to do. The population of these areas has been increasing at the rate of 2.5% annually. This means that every year at least 250,000 more new mouths demand feeding, so many more new job-seekers enter the labor market asking for daily work and a living in the country where *industry is still in its embryonal stage* and where *fertile land is limited* in size and dried out in nature. There is but little water available; though, with proper irrigation, the land could be conquered and its farming green area doubled as it has been engineered in Egypt by Britain and in the Tennessee Valley by America.

It is the opinion of French medical men that semi-starvation made the French pro-

tectorates in Africa a terrain favorable for revolting, a hotbed for communist agitators who were able to capture the nationalistic movements. The food misery is a sizeable element in the physical and political sickness of Morocco and Algeria. The latest good turn in Franco-African affairs was hailed in France as the right track, a highly effective form of *medico-social deep therapy, the wise Politics of the Rice Bowl*, administered by the present French government to avert the otherwise inevitable Mediterranean schism. Whether the rice bowl will also reconquer the African soul for France is an open question. The Marseillaise no longer seems to sound an impressive tune in Africa. As far as the French Medical Academy is concerned, however, even the population of France and of North Africa may have a common ancestry, though we would surely doubt such French statements—made mainly to placate the rough racial feelings—that *the Berber race were as predominantly Celtic as the French*; or, that, with the exception of Tunisia, there were less than a minimum of Arab blood in French North Africa.

On January 17, 1956, the *National Academy of Medicine in Paris* held a solemn session to celebrate the 250th anniversary of Benjamin Franklin, who had been elected an illustrious member of that Academy in 1777. At the meeting, Madame Corry, a late descendant of Mr. Franklin, was also present. On this occasion, the Academy was awarded a commemorative medal, a gift of America, which was delivered by a spokesman of our Paris embassy. The society learned that Franklin's scholarly development had been made possible by the experimental spirit of the growing scientific associations in 17th and 18th century Europe. It was perhaps in France where Benjamin Franklin experienced the truth of the aphoristic saying, inscribed on the commemorative gift medal, that *"Wise and good men are the strength of a State far more than riches or arms."* The importance of Franklin in the field of medicine was also discussed at the celebrating session of the Academy. (N.B. I had the other day the pleasant duty to treat a young

descendant of Mr. Franklin as a patient in my office.)

We will perhaps recall that last October 21 was the 150th anniversary of the famous naval battle in which Nelson smashed the combined fleets of France and Spain off Cape Trafalgar. He died in the battle, but his grateful nation awarded a *perpetual "veteran's" pension of \$15,000* to his heirs. Since 1806 until 1951 the pension had been faithfully paid to the admiral's brother and his descendants, since Nelson himself had but an illegitimate daughter by Lady ("My Dearest Emma") Hamilton. In the recent dire economic crisis of Britain, the pension was cut off without compensation. In his attempt to collect his compensation in a lump sum, estimated at several hundred thousand dollars, the present heir is now said to face even larger odds than the one-armed-one-eyed hero faced at Trafalgar.

Some time ago a special discussion was staged in the Royal Society of Medicine in London for the consideration of *head injuries in civilian practice*. Over 70% of the fatal road accidents in England are associated with a head injury, and their number reaches 35,000 annually. Accidents of motor cyclists are chiefly of this type. To reduce their risk, the wearing of crash helmets was recommended. It was recognized that the mortality of head injuries was high; that it could be reduced considerably if the injured were transferred to a neurosurgical center. In Scotland, where geographic conditions are very complex, *neurosurgical "Flying Squads"* are now ready to come at a phone call whenever the general surgeon in the country becomes worried about possible complications in his patients.

Among the *valuable food plants of South America*, the *pigweed* (*Chenopodium quinoa*) is of great significance, particularly because it grows abundantly in the high mountains of Bolivia, Peru, and Chile. The plant is natural at the highlands of the Andes, 9,000-12,000 feet above sea level, and it resists intense cold or prolonged dry weather. It prefers well-drained, clayish-sandy soil. The plant is rich in protein

(22.8%), fat (5%), carbohydrates (66%), minerals (Fe 0.13%, Cu 0.008%) and vitamins (0.023%) such as thiamine, riboflavine, niacine, and, thus, it may be also considered as a *medicinal plant*. It had been a staple food of Bolivian Indians in the Andes since the time of the Incas. Not the corn, but the pigweed was the main cereal of the land; only the Spanish conquest pushed it into second place. The Indians rarely eat meat, or fruits, but the major part of their food is prepared from pigweed. One of the dishes is *kispiña*, made of the slightly roasted flour of pigweed. The flour does not easily decompose; hence, it can be used as ration on long trips. The Indians also prepare an alcoholic fermented beverage of pigweed called *chicha de quinua*. The ashes of the stem are mixed with cocoa for chewing.

A Bolivian engineer, while working in the U. S. Agricultural Department, proved the value of pigweed in breadmaking, and in preparing *concentrated rations for the Army*. Pigweed flour can be mixed with an equal part of wheat flour, and the bread is still easily baked; but 30% is the best flour mixture for digestibility. The acclimatization of the food plant in other countries (U.S., Argentina, Germany, England) proved to be very successful.

"Red Cross of the Monuments" is the name of the May 24, 1954, Hague Convention for the protection of cultural values in case of an armed conflict. The convention is not yet signed by all nations (The U.S. signed it, though). It is hoped that, *a fortiori*, the new convention will stimulate those other humanitarian proposals of international committees which intend to protect the defenseless civilian population against the new weapons, and the aerial hostilities in general. After all, *human beings have value far superior* to that of works of art. But, states and governments might think otherwise. "Monuments, and churches, and cathedrals, and libraries are unique for all Mankind. You, People, are on the contrary easily replaced, indeed much quicker than it ought to be"—the State may say. But, are not the Michelangelos, the Henry Dunants, the

Albert Schweitzers, the Benjamin Franklins, and the Abraham Lincolns also in the people, among the people and of the people? Human beings are just as irreplaceable as the works of art. Hence, they should be treated with the same respect at least as the museum pieces, and the monuments of architecture.

Recent visits of foreign physicians to Russia have somewhat modified our ideas about *organized Russian medicine*. Though medical service is entirely free in Russia, private practice still exists in a very small proportion. Doctors are salaried:—a new one gets 670 roubles a month, a general practitioner gets 1,200 roubles or more, a professor receives 5,000 roubles. At 55, after 25 years of service, the doctor becomes eligible for pension at half of his salary. In each district there is a medical commission for maintaining discipline and for making appointments to vacancies. For the first three years, a new doctor must practice where he is sent. The doctor-inhabitant ratio is now 1:660.

*Russian medical schools* have fewer places than there are applicants. Hence, competitive examinations are required for the selection of the best. The medical scientific standard is difficult to evaluate. The visitors' impression was that medical research is behind Western medicine in some respect, and information about western medical progress is not satisfactory. *The family doctor* as such does not exist any more in Russia, though doctors may visit their patients at home. There are over 1,300 centers, so-called sanatoria, for rest and health recovery. These places combine free treatment with paid hotel accommodations. Public health service does not exist in the western sense. Curative and preventive work, namely, is not held apart in the official medical and health districts.

From now on there will be a much quicker communication between Moskva and Peiping. The *Transmongolian Railway* was finally completed; it shortens the road of red travellers by approximately a thousand miles. The new line is the first outlet for Outer Mongolia, the land of the Gobi Desert. It is interesting that all generators and elec-

tric equipment of this railway line were manufactured in Hungarian factories. This is another evidence of Red "colonialism" which Russia instituted in its captive satellite countries. No wonder that Rákosi, the communist boss of Hungary, confessed in a recent speech that his country was at the verge of economic bankruptcy.

One of the correspondents of a well-informed Milano paper recently painted a very dark picture of the *daily life in Budapest*. Once a week, meat is sold at the market of the Hungarian capital; those who want meat must queue at the wee hours of the morning. The Red politics aim at an increase in export to foreign countries at the cost of home consumption. A day's work of nine hours brings an average of 600-700 forints for the worker monthly. A taxi driver's income is 620 forints a month while a small clerk's salary is 900 frt. A high-school teacher gets 1,500 frt. and a *medical professor earns 2,500 frt.* The salary of a pharmacist is 1,200 frt., while practitioners and engineers earn 1,800 to 2,000 frt. But this salary is really not much since a shirt

costs 280-320 frt. and a man's ready-made suit is sold for 1,800 frt. The price of a cheap radio is 2,500 frt. (Here is the greatest obstacle to the Voice of America project.)

*Rene Lariche* (1879-Dec. 30, 1955), the famous French neurosurgeon, died. According to his last wish, his death was not announced until ten days after his funeral. Another famous European physician, *Emil Feer* (1864-1955), pediatrician in Zürich, was recently lost to the world; he was 91 years old (Eponym: Feer's disease or acrodynia, described in 1922-23).

In France, a dentist by the name of David Solo, started a new form of art, aptly called "*dental painting*." In simple setting, the paintings show the teeth and an armada of forceps (Cicero should forgive us for not using *forcipes* for this plural) in the role of human beings. "The Fight of the Forceps," "The Flight of the Forceps," "Dancing Forceps," "The Circus," "Family Tong," and "The Toreador" are the six cleverly executed paintings that were carried all over Europe on exhibits, and met with unanimous approval of the art critics . . . *Multa paucis!*



## MEETING—NEW YORK CHAPTER

POSTPONED FROM MARCH

ASSOCIATION OF MILITARY SURGEONS OF THE U.S.

MAY 17, 1956—MITCHELL FIELD, N.Y.

*Inspection tour*—5:00 P.M. AT OPERATIONS OFFICE

*Cocktails*—6:00 P.M. *Dinner*—7:00 P.M.

Officers Club Price \$3.00

*Bring the Ladies*

CAPT. H. EASTON McMAHON, MC, USNR, SECRETARY

105 EAST 53RD ST., NEW YORK 22, N.Y.



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It is a privilege to list the firms who have joined The Association of Military Surgeons as Sustaining Members. We gratefully acknowledge their support.

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## ASSOCIATION NOTES

Timely items of general interest are accepted for these columns. Deadline is 3rd of month preceding month of issue.

### Department of Defense

*Ass't Secretary* (Health & Medical)—HON.

FRANK B. BERRY, M.D.

*Deputy Ass't sec'y*—HON. EDW. H. CUSHING, M.D.

#### SELECTIVE SERVICE CALL

The Department of Defense has requested the Selective Service System to provide the Army with 12,000 men during May. There will be no call for men for the Navy, Marine Corps, or Air Force.

#### STRENGTH OF ARMED FORCES

The total numerical strength of the Armed Forces on January 31, 1956 was 2,876,013; Army—1,070,683; Navy—669,725; Marine Corps—199,805; Air Force—935,800. This represents a decrease of 11,003 from the December 31, 1955 combined strength of 2,887,016.

#### RETIRED PERSONNEL

Offices to which retired personnel may address their communications regarding special problems that they may have are now located as follows: (Army) Retired Activities Unit, Personnel Services Branch, Room 1E 640, The Pentagon, Washington 25, D.C.; (Navy) Chief of Naval Personnel, Attn. Pers G or Room 1816 Navy Annex, Washington 25, D.C.; (Air Force) Retired Personnel, Room 4D 1087, The Pentagon, Washington 25, D.C.

### Army

*Surgeon General*—MAJ. GEN. SILAS B. HAYS

*Deputy Surg. Gen.*—MAJ. GEN. JAMES P. COONEY

#### SGO ASSIGNMENT

Col. Watson E. Neiman, MC, has assumed his duties as Chief of the Hospitalization and Operations Branch, Office of the Surgeon General. In 1954 he received the M.A. degree in hospital administration from Northwestern University.

#### ASSIGNMENT AT WRAMC

Colonel Maurice W. Hale, VC, has been named Director of the Division of Veterinary Medicine at the Walter Reed Army Institute of Research. He succeeds Col. Chester A. Gleiser, VC, who is being assigned to a station in Germany.

#### DOUBLE DUTY

Second Lieutenant Warren H. Hoffman has recently been commissioned in the Army Medical Specialist Corps. He is professionally qualified as both a physical and an occupational therapist.

In 1952 he received his A.B. degree in physical therapy from Stanford University, and in 1954 completed the occupational therapy course at San Jose State College, Calif. He has been assigned to the Walter Reed Army Hospital as an occupational therapist.

#### HEALTH NURSING MANUAL

A group of nurses met recently at the Walter Reed Army Institute of Research for the purpose of preparing material for a standardized Army Health Nursing Manual.

The director of the group was Captain Elizabeth A. Pagels, Chief of the Army Health Nursing Branch, Office of the Surgeon General.

#### DENTAL CHAIR DEVICE

An adjustable leg cradle to be attached to a dental chair for the use of amputee, fracture, and circulatory disorder cases while undergoing dental treatment has been devised by Mrs. Lucille M. McClain, former dental assistant at Walter Reed Army Medical Center. Presentation of a cash award was made to her by Brig. Gen. Arthur L. Irons, Director of Dental Activities of the Center.

Army and Veterans Administration hospitals throughout the country will soon use the device.

#### VISITS BAMC



U. S. Army Photo

Maj. Gen. Hecmi Sar, Deputy Surgeon General of the Turkish Armed Forces (right) is shown signing the guest register at the Brooke Army Medical Center, Fort Sam Houston, Texas, at a recent visit there. Maj. Gen. William E. Shambora, the Commanding Officer of the Center, conducted General Sar on the tour of that medical installation.

#### POSTGRADUATE COURSE

*Surgery in Acute Trauma: A Practical Approach* was the subject of a postgraduate course held April 2, 3, and 4 at the Brooke Army Hospital, Brooke Army Medical Center, Fort Sam Houston, Texas. About 100 active duty and reserve Army, Navy, and Air Force medical officers attended.

This very instructive and timely course was under the direction of Colonel Warner F. Bowers, Chief of the Department of Surgery, assisted by 34 members of the hospital and the Surgical Research Unit.

General subjects considered were the management of chest, abdominal, and head injuries, treatment of burns and fractures, resuscitation and anesthesia for all types of injuries. A demonstration of wound ballistics at Camp Bullis concluded the course.

#### CANADIAN DENTAL OFFICER VISITS BAMC



U. S. Army Photo

Lt. Col. S. A. L. Millar, Commandant of the Royal Canadian Dental Corps School in Ottawa, is shown above (center) with Col. Howard N. Burgin, Commander of the Central Dental Laboratory at Brooke Army Medical Center, Fort Sam Houston, Texas, while Pvt. Chas. Fandale shapes a denture.

#### BAMC ASSIGNMENT

Lt. Colonel Carl Goetz, MSC, has been named Director of the Plans and Operations Division at the Brooke Army Medical Center. During World War II he served in the China-Burma-India Theater. From 1952-

1955 he was assigned to U. S. Army Headquarters in Europe.

Colonel Goetz replaces Colonel William J. Moreland who has just retired, and will reside at 2735 Carissa Drive, Vero Beach, Fla.

#### MSC OFFICER HONORED



U. S. Army Photo

The Honorable John M. Allison, U. S. Ambassador to Japan, is shown above placing the award of the Silver Beaver on Colonel Warren C. Eveland, MSC, senior bacteriologist in the U. S. Army, and now on duty at the 406th Medical General Laboratory, Camp Zama, Japan.

Colonel Eveland was one of two who received the award out of a potential of 1400.

#### DENTAL CORPS EXHIBIT



U. S. Army Photo

Col. Oscar J. Ogren, Fifth Army Dental Surgeon and Capt. John R. Waters, Administrative Assistant are shown above with a letter of congratulation from the Chicago Dental Society at the Army Dental Corps exhibit at Chicago, March 3.

On that date the Army Dental Corps celebrated its 45th anniversary. It is interesting to note that the present chief of the Army Dental Corps, Maj. Gen. Oscar P. Snyder, has spent almost forty of those years in the Corps.

#### PERMANENT FORTS

Five Army installations formerly known as *Camps* are now designated: Fort Chaffee, Ark.; Fort Leonard Wood, Mo.; Fort Gordon, Ga.; Fort Stewart, Ga.; Fort Jackson, S.C.

#### CHEMICAL WARFARE LABORATORY

The Army Chemical Corps recently organized the Chemical Warfare Laboratories at the Army Chemical Center, Maryland. They are one element of the Chemical Corps' Research and Development Command.

The Laboratories are divided into four Directorates: Research (Director—Dr. Wm. H. Summerson); Medical Research (Director—Col. Albert R. Dreisbach); Development (Director—Col. Donald E. Yanka); and Technical Services (Director—Mr. James P. Mitchell).

#### UNIFORM ALLOWANCE

Reserve Officers may be paid \$50 for the purchase and maintenance of their uniforms upon completion of 4 years of satisfactory service, after July 9, 1952. Thus after July 9, 1956, those Reserve Officers who can qualify may obtain that amount of money. The authority for this is AR 35-1710 (change 1).

## Navy

Surgeon General—REAR ADM. BARTHOLOMEW W. HOGAN

Deputy Surgeon General—REAR ADMIRAL BRUCE E. BRADLEY

#### NEW CO AT NMMC

Captain E. C. Kenney, MC, U. S. Navy has replaced Rear Admiral H. Lamont Pugh as the Commanding Officer of the National Naval Medical Center at Bethesda, Maryland.

Captain Kenny has been the Commanding Officer of the Naval Hospital at the

Center since September 1955. He is a native of Ohio, graduated from the University of Cincinnati Medical School in 1929, and entered the Medical Service of the Navy after graduation.

#### LEPROSY BOARD CHAIRMAN

Dr. Howard T. Karsner, Medical Research Advisor to the Surgeon General of the Navy, has been elected chairman of the Advisory Medical Board of the Leonard Wood Memorial for the Eradication of Leprosy (American Leprosy Foundation).

This Memorial was established nearly thirty years ago in tribute to General Leonard Wood, whose keen interest in leprosy was excited during the time he was Governor General of the Philippines.

#### AWARDED MEDAL

Quick action on the part of Captain Lloyd B. Shone, MC, U. S. Navy on August 27, 1955 has led to the award of the National Safety Council Presidents' Medal. He performed a tracheotomy on Ralph Hunt, the 13 year-old son of Captain Ralph B. Hunt, USN (Retired) when the boy aspirated an ear plug which he had in his mouth while swimming.

The medal is one of 2,000 that has been awarded since 1928 for successful resuscitation in the saving of life by the Schafer Prone Pressure or Holger Nielsen Arm-Lift Back-Pressure Methods.

#### ALUMNI AWARD

Captain Walter N. Gallagher, DC, U. S. Naval Dental School, National Naval Medical Center, Bethesda, Maryland, has been selected by the Dental Alumni Association of Temple University to receive the Alumni Award for 1956.

The award will be presented at the Founders Day Dinner this month, in Philadelphia.

Captain Gallagher is the author of two textbooks on dentistry and the inventor of a water control device for dental cuspidors.

#### CIVILIAN CONSULTANT (DENTAL)

Dr. Harry Lyons, of Richmond, Virginia, and President-Elect of the American Dental

Association, has been appointed as Honorary Civilian Consultant (Dental) to the Surgeon General.

#### DENTAL NEWS

The present percentage grade structure of the Naval Dental Corps appears as follows: 26% captains, 11% commanders, 9% lieutenant commanders, and 54% lieutenants.

#### NURSE CORPS ANNIVERSARY

The 48th anniversary of the establishment of the Navy Nurse Corps will be celebrated on May 13. The first trained nurses engaged by the Navy were stationed at the Naval Hospital, Norfolk, Virginia in 1898 to care for the sick and the wounded of the Spanish-American War. The corps was officially established May 13, 1908.

#### CORRESPONDENCE COURSES

Forms have been revised for enrollment at the Naval Correspondence Course Center, Brooklyn, New York, and the Naval Medical School, Bethesda, Maryland.

Medical Department Reservists are requested to use only the following forms:

Application for Enrollment in Officer Correspondence Course, NavPers 992 (Revised 10/54) or, forthcoming forms with revision date later than 10/54.

Application for Enrollment in Enlisted Correspondence Course, NavPers 580.

*Medical Department Orientation*, NavPers 10943-A is a new correspondence course pertaining to the historical background, mission, functions, and facilities of the Medical Department ashore and afloat. Throughout the course, the application of professional skills to naval requirements is stressed.

The course is evaluated at six Naval Reserve promotion and non-disability retirement points, and is designated as a course that may be retaken for point credit inasmuch as it is based upon a completely new and revised text.

Applications should be submitted on Form NavPers 992 (Rev 54) and forwarded through channels to the Commanding Officer,



U. S. Naval Medical School, National Naval Medical Center, Bethesda 14, Md.

#### RESERVIST TRAINING

Naval Reservists whose occupation requires them to be away from their parent unit may be temporarily assigned to other drilling units. Such assignments may be made without regard to the authorized allowance of the unit to which temporarily assigned.

#### RETIRED

CDR Karl E. Schweinfurth, MSC, was retired on April 1 after completing more than 31 years of continuous active service. His address will be Route #2, Vass, N.C.

Captain William R. Burns, DC, was retired on April 1 after 33 years of active naval service. His permanent home address is 845 Lugerne St., Johnstown, Pa.

## Air Force

*Surgeon General*—MAJ. GEN. DAN C. OGLE  
*Deputy Surg. Gen.*—MAJ. GEN. W. H. POWELL, JR.

#### MEDICAL PROBLEMS WITH THE JETS

Recently a group of distinguished medical educators visited the School of Aviation Medicine at Randolph Air Force Base, Texas, and were told of some of the problems with the "century" series of supersonic jet fighters—F-100, F-101, and F-102.

Colonel Vincent M. Downey, Director of Plans and Training, told of the serious medical problem in the matter of escape for the pilot. The shock and windblast upon leaving a jet at supersonic speed makes even the latest automatic ejection seat a doubtful aid.

Visual difficulties in flying beyond the speed of sound was a problem discussed by Colonel Richard S. Fixott, Chief of the Clinical Medicine Division.

Then there was the problem of noise for the maintenance workers. This was discussed by Lt. Colonel Ralph N. Krause, Head of the Ear, Nose, and Throat Department.

Colonel John R. McGraw, the Acting Commandant since the death of Brig. Gen.

Edward J. Kendricks, discussed the overall problems of the school.

#### TRIP TO MOON

Well, it has not happened yet but it is in the events to happen. At least a trip one-third of the way under simulated conditions has been made to the moon by Airman Dalton F. Smith, Jr., of New Orleans. It all happened on the ground at the Air Force School of Aviation Medicine, Randolph Air Force Base, Texas, when this 19 year old airman was put in the Space Cabin Simulator.

Dr. Hubertus Strughold, Head of the Department of Space Medicine at the School, and an internationally known authority on medical conditions of space flight, ordered the apparatus two years ago, at about the time that Air Force Major Arthur Murray and other pilots were setting fantastic new altitude records in the rocket powered X-1A.

The sealed cabinet provides the air, the means for removing heat, excess moisture, and waste products. Communication with the outside is provided, and heavy windows allow observers to watch the traveler. Want a ride?

#### RESEARCH OPPORTUNITIES

Two kinds of research grants are available at the Air Force School of Aviation Medicine. A Research Assistant works on the staff of the school on a project approved by the Air Force. This is a one-year appointment. A Research Associate, open to a faculty member of a recognized college or institute, works on a problem at his own school.

Recently William G. Glenn, a graduate of Rutgers University, obtained his Ph.D. degree by working as a Research Assistant on the problem of the purity of proteins.

## Public Health Service

*Surgeon General*—LEONARD A. SCHEELE, M.D.  
*Deputy Surg. Gen.*—W. PALMER DEERING, M.D.

#### POLIO VACCINATION

The supply of poliomyelitis vaccine should

be used to provide immunization for the greatest number of children between the ages of 6 months and 14 years, according to the National Foundation for Infantile Paralysis.

Vaccine should not be held back to provide a second injection, recommended *after* a two-week period from the initial injection. Nor should there be any withholding of the vaccine to provide a third injection recommended *after* the seven-month period from the second injection.

In other words use what is available to give the initial injection of Salk vaccine to those children between 6 months and 14 years of age and to pregnant women who desire it.

There are estimated to be 35 million children in need of the *initial* injection of Salk vaccine. More vaccine is being made available with the increased production facilities in the pharmaceutical laboratories.

#### COMMISSIONED RESERVE

Physicians, dentists, pharmacists, nurses, and other qualified personnel of the allied medical groups are being encouraged to apply for commissions in the Commissioned Reserve of the Public Health Service.

The Surgeon General, Dr. Leonard A. Scheele, said that the Commissioned Reserve is being expanded to meet the public health demands in national emergencies. Personnel will be called for emergency duty primarily to reinforce the staffs of official state and local health agencies, but he also stated that they will not be called except on a volunteer basis, unless the situation is publicly recognized as requiring such action.

Interested persons should write the Surgeon General, Public Health Service, Department of Health, Education, and Welfare, Washington 25, D.C.

#### APPOINTMENT

Dr. Dorland J. Davis, who has served since 1954 as Chief of the Laboratory of Infectious Diseases, has been appointed Associate Director of the National Institute of Alergy and Infectious Diseases at the National Institutes of Health, Bethesda, Maryland.

He joined the Public Health Service in 1939. In 1955 Dr. Davis was awarded the Edward Rhodes Stitt Award of our Association for his outstanding work in the field of antibiotics.

#### HONORED

Two doctors of the Public Health Service have recently been honored with the degree, doctor *medicinae honoris causa*, which is awarded once every five years to distinguished foreigners by the University of Oslo, Norway.

Dr. Carroll E. Palmer, Chief of Operational Research for the tuberculosis program, has spent much of his time in research on tuberculosis and other infections of the lung, and recently has been working on the development of a specific preventive for tuberculosis. He joined the Public Health Service in 1936.

Dr. Laurence Irving, Chief of the Physiology Section of the Arctic Health Research Center in Anchorage, Alaska, has done extensive research on living conditions in the arctic. Practical applications of his research have included improvements in the clothing and shelter of Americans stationed in arctic climates. He joined the Public Health Service in 1949.

#### HOSPITAL SERVICES IMPROVEMENT

The Federal Hospital Council acting under the Hospital Survey and Construction Act recently made grants to a number of hospitals and interested groups for the purposes of studying means for the improvement of hospital services.

Such matters as these are to be studied:

- (1) Methods of evaluating a hospital's out-patient service as part of its whole program of medical care.
- (2) Value of supplying member hospitals with continuous services of consultants in the fields of personnel and dietary administration.
- (3) Development of a nontechnical manual of specific guides to be used in accounting techniques in hospitals.

- (4) Study of medical records systems on coding and indexing.
- (5) Advantages and disadvantages of supplying private offices in hospitals for doctors.
- (6) Management improvement programs.
- (7) Training of dietary supervisors (not graduate dietitians) for small hospitals.
- (8) Plans for coordination of a base hospital center with the health and medical resources in area served by base hospital.
- (9) Demonstrations of coordination of hospital and health services in a city and its suburbs.
- (10) Relationship of social organization of a community and a general hospital.
- (11) Standards and procedures for keeping and using medical records in chronic disease hospitals.

#### P-GAL TRANSFERASE

Galactosemia has yielded its secret to the National Institute of Arthritis and Metabolic Diseases. P-Gal transferase, an enzyme found in red blood cells, completes the conversion of galactose to glucose.

When that enzyme is not present galactosemia, a rare disease, results in liver disease, blindness or even death, since the galactose in the blood stream cannot be converted in the liver to glucose.

A spectrophotomotor test is made on the blood to determine the presence of the disease. Credit for this discovery is due Dr. Herman M. Kalckar and his associates, Drs. Elizabeth P. Anderson and Kurt J. Isselbacher.

#### SCREENING OF DRUGS FOR CANCER

The Public Health Service has undertaken a tremendous project of a large-scale screening of chemical compounds in a search for some that might be useful in the treatment of cancer. Much of the work has been farmed out to research laboratories throughout the country. It is hoped that by July at least 2,000 compounds will be tested.

## Veterans Administration

*Chief Medical Director*—WILLIAM S. MIDDELTON, M.D.

*Deputy Chief Med. Dir.*—R. A. WOLFORD, M.D.

#### ASSIGNMENTS

Dr. John A. Kennedy has been appointed Director of the Surgical Service in the Veterans Administration Office, Washington, D.C. He joined the VA in 1930, and has served continuously except for the period of World War II when he was with the Navy Medical Service.

Dr. John B. Barnwell has been appointed Assistant Chief Medical Director for Research and Education in the Department of Medicine and Surgery of the Veterans Administration at the Central Office, Washington, D.C.

Dr. Barnwell has headed the VA Tuberculosis Service since 1946, and was honored in 1950 by the National Tuberculosis Association with the Trudeau medal. During World War I he served in the Army as captain of artillery, and after the war pursued a medical course, receiving his medical degree in 1923 from the University of Pennsylvania. In 1928 he joined the University of Michigan as an instructor and later became associate professor and physician in charge of the tuberculosis unit in the School of Medicine. After 18 years with that university Dr. Barnwell resigned to join the Veterans Administration in which he has carried on his work in tuberculosis.

Dr. Horace D. Smith has been appointed manager of the Veterans Administration hospital at Omaha, Nebraska from an assignment of director of professional services at the hospital in Long Beach, Calif.

Dr. Clifford C. Woods who had been manager of the VA hospital at Omaha is now in the same position at Memphis, Tenn.

Dr. Warren L. Fleck has been transferred from the Ft. Howard, Md., VA hospital to the Dwight, Ill., hospital as manager.

Dr. Daniel R. Robinson is now manager of the Ft. Howard VA hospital. He was

manager of the VA hospital at Dwight, Ill.

Dr. Roderick G. St. Pierre, a psychiatrist at the VA hospital at Palo Alto, Calif., has been appointed manager of the Roseburg hospital, Roseburg, Oregon. During World War II he served in the combat zone in Europe, and attained the rank of lieutenant colonel. He is a graduate of Georgetown University (1933).

Dr. Lester Drubin, who was director of professional services at the VA hospital in Northport, L.I., has been appointed manager of the Jefferson Barracks hospital, Mo. He joined the Veterans Administration in 1940.

Dr. Harry G. Hockett, has been appointed manager of the VA hospital at Marion, Ind., from the position of Director of Professional Services at that hospital.

Dr. Clifford C. Woods has been assigned as manager of the VA hospital at Park Avenue and Getwell Street, Memphis, Tenn., succeeding Dr. Hugh L. Prather, who has retired for disability.

Dr. William K. Freeman has succeeded Dr. Arthur H. Mountford as manager of the Veterans Administration hospital at Tuscaloosa, Ala.

Dr. William K. Bourke, Chief of Psychiatry and Neurology at the area office in St. Paul, Minn., has replaced Dr. Freeman as manager of the Downey, Ill., VA hospital.

#### PHARMACY RESIDENTS

Three pharmacists will receive the degree of Master of Pharmacy (Hospital) at the University of Southern California in June, and will also be awarded certificates for the satisfactory completion of the residency in hospital pharmacy which is now a four-year old program in the Veterans Administration.

The members of this two-year combined academic and professional residency are: Chester G. Bazel, Morris P. Dooks, and Walter C. Fischer. They are on duty at the VA Center in Los Angeles, Calif.

Applicants for residency are selected from a nation-wide Civil Service register, must be citizens of the United States, graduates of an approved College or School of Pharmacy, have at least a B.S. degree, licensed in a

State, and otherwise meet the requirements of the cooperating university.

#### COMPENSATION REVIEW

The Veterans Administration is in the process of reviewing cases of compensation and pension claims. The review will eventually cover a total of 1,713,280 cases and it is estimated that it will take about three to four years.

The purpose of the review according to Mr. Harvey V. Higley, Administrator of Veterans Affairs, is to make certain veterans are receiving the compensation and pension benefits to which they are rightfully entitled under the law.

"To deny a single veteran the benefit to which he is legally entitled would be an obvious injustice," he declared. "On the other hand, no one can justify continuation of a benefit payment which is based on error."

### Miscellaneous

#### JOINT BLOOD COUNCIL

In a letter to Dr. Leonard W. Larson, president of the Joint Blood Council, Inc., President Eisenhower said, "Our people need a nationwide blood service, coordinated not only to take care of national emergencies, but to make available to them in time of peace the blood and its derivatives necessary to save life wherever the requirement may arise."

The Joint Blood Council with offices at 1832 M St., N.W., Washington 6, D.C., has been established for just that purpose. Member institutions are: the American Medical Association, the American Association of Blood Banks, the American Hospital Association, the American National Red Cross, and the American Society of Clinical Pathologists.

Dr. Frank E. Wilson, a brigadier general in the Medical Corps (Reserve) of the Army, is the Executive Vice President and Secretary of the Council.

#### HISTORY OF MEDICINE

Forty oil paintings depicting major events

and personalities in the medical profession during the past 5,000 years will constitute the "History of Medicine in Pictures" to be produced under the sponsorship of Parke, Davis & Company, Detroit, Mich.

Dr. Erwin H. Ackernecht of Madison, Wis., professor and chairman of the Department of History of Medicine, University of Wisconsin Medical School will be the principal advisor. Dr. George A. Bender will write the story for each picture, and Robert A. Thom will do the art work.

#### MEDICAL HISTORY

*Papers of the Soviet Delegation of Medical Historians*, presented at the 16th International Congress on the History of Medicine Rome-Salerno, Sept. 1954. Moskva, 1954.

Under this made-up title we wish to call attention to three recent works written by medical historians in Russia and presented to the world at the international meeting in 1954. The works were afterwards published by the Russian government in Russian and an English translation. The six pamphlets of the three interesting papers reached the Editorial Office of Military Medicine several weeks ago.

One of them, the paper by B. D. Petrov on "The Role of Russian Scientists in Medicine," gives a brief outline of the development of medical knowledge in Russia from the time of "Kiev Russia" in the eleventh century to the present. Another paper, the one by V. N. Ternovsky, reveals the depth of contemporary Russian research into the medical history of the renaissance. The third pamphlet, written by N. A. Vinogradov, with the title "The Role of the Physician in Russia in Guarding the Health of the People," is a good summary of the development of public health and sanitation in Russia.

#### FOREIGN CLAIMS

Individuals and corporations who may have claims against Bulgaria, Hungary, Rumania, or Italy must file their claim before September 30, 1956 with the Foreign Claims Settlement Commission of the United States,

Tariff Commission Bldg., 7th & E Sts., N.W., Washington 25, D.C.

Eligible claimants, under the law (PL 285, 1955), generally are restricted to Americans who were citizens of the United States at the time their losses occurred.

#### PROSTHETIC SPECIALIST ASSISTS

William Tosberg, prosthetic specialist at the Institute of Physical Medicine and Rehabilitation of New York University-Bellevue Medical Center is visiting seven countries to teach and consult on the latest developments on artificial limbs. His participation in this project is as an expert with the Technical Assistance Administration of the United Nations.

#### AMA MILITARY MEDICAL SECTION

The Military Medicine Section of the American Medical Associations' Annual Scientific Program will meet on June 12-14 at the Cinema Theater Auditorium, 151 East Chicago Avenue, Chicago, Illinois during the AMA Annual Meeting.

Captain Cecil L. Andrews, MC, U. S. Navy, is Secretary of the Military Medicine Section. He is Director of the Professional Division in the Bureau of Medicine and Surgery, Department of the Navy, Washington, D.C.

Rear Admiral H. Lamont Pugh, MC, U. S. Navy, is Chairman of the section and will open the meeting with an address at 9:00 A.M., June 12.

Reserve Medical Officers (inactive) of the Army, Navy, and Air Force will receive retention or retirement point credits for attendance. One point will be awarded for each day attended.

#### PHYSICAL THERAPISTS MEET

The Second Congress of the World Confederation for Physical Therapy will be held at the Hotel Statler, New York City, June 17-23.

Physical therapists and other health specialists from more than 20 countries will confer on worldwide rehabilitation problems.

Offices of the Executive Director are located at 1790 Broadway, New York.



## MEETING

The American Association of Rehabilitation Therapists will hold its Annual Conference and Clinical Session at Long Beach, Calif., June 18-22.

## MEETING IN GERMANY

The Fourth International Congress on Diseases of the Chest of the American College of Chest Physicians will meet in Cologne, Germany, from August 19-23.

The main subjects which will be discussed deal with the problems of coronary diseases (diagnosis, pathophysiology and surgery), industrial diseases of the chest, tuberculosis, lung and heart function and tumors of the mediastinum.

Further information may be obtained from the Vice-President, Prof. Dr. med. Dr. h. c. H. W. Knipping, Cologne; or the Executive Director, 112 E. Chestnut St., Chicago 11, Ill.

## MEETING

The Biological Photographic Association, Inc., will hold a meeting in the Powers Hotel, Rochester, N.Y., August 27-31. This association is concerned with the techniques and applications of photography in medicine, zoology, botany and other related fields.

Further information can be obtained by addressing the association at 343 State St., Rochester 4, N.Y.

## ANTIBIOTICS SYMPOSIUM

*The Fourth Annual Symposium on Antibiotics* will be held in Washington, D.C., October 17-19. Symposium papers should be directed to: Dr. Henry Welch, Food and Drug Administration, Dep't. Health, Education, and Welfare, Washington 25, D.C.

## MEETING

The Ninth Annual Conference on Electrical Techniques in Medicine and Biology will be held at the Governor Clinton Hotel in New York City, November 7-9.

Titles and brief abstracts for papers may be submitted to the Conference Chairman, E. Dale Trout, General Electric Co., X-ray Dep't., Milwaukee 1, Wis.

## MAGAZINES NEEDED ABROAD

Certain magazines are needed abroad for libraries in schools and cities. Much can be done through the medium of magazines to acquaint the people of foreign countries with our American way of life. The cost is small to us.

For full information address: Magazines for Friendship, Inc., c/o Occidental College, Los Angeles, California.

## BOOKS FOR KOREA

Donations of naval and military texts are wanted by the new tri-service *National Defense College of the Republic of Korea*. The school made its appeal for books in a letter from General Chung Il Kwon, ROK Army Chief of Staff to Vice Adm. W. M. Callaghan, Commander, Naval Forces, Far East. Contributions large or small are welcome.

Book donations should be mailed to: Office of Chief of Staff, Republic of Korea Army, Seoul, Korea. The Post Office Dep't advises that there is a 6 lb. 9 oz. limit per package. The rate is 2¢ for the first 2 oz., and 1½¢ for each additional 2 ounces.

## NEW BOOKS

*Welcome Aboard, a Service Manual for the Naval Officer's Wife*, is a completely revised book which was first published in 1951 by Florence Ridgely Johnson, wife of an admiral in the U. S. Navy. For years Mrs. Johnson has been collecting the questions that wives of Navy officers have been asking, and at the same time recording the answers to these questions. Here are the results in easily readable form for the ladies who are newcomers to this branch of the Armed Forces. Through the lady readers the men will learn much also for there are answers to the never ending problems of the business side of the family life. Of course, the traditions of the service and the social graces are well covered.

The ladies won't go wrong in spending \$3.50 for this book which can be procured from the U. S. Naval Institute, Annapolis, Maryland.

*So You're Going in the Army* is "sound advice for the prospective soldier." Of

course the recruit will learn much of what is in this book over a period of time, but it would certainly be to his advantage to know many of the things recorded in this book before he ever leaves his home. The very first chapter is "Putting Your Affairs in Order." The book is not intended to be a complete treatise on the life of a soldier, but seems designed to get him over the first hump that lies between the civilian and the trained basic.

The book which contains a complete index has 171 pages and is moderately priced at \$1.95. The author: Captain John L. Begley, Infantry, U. S. Army. The publisher: The Military Service Publishing Company, Harrisburg, Pa.

#### WAR-DIARY

*War-Diary of an Army Psychiatrist* by Merrill Moore, M.D., Boston, Mass., one of our members who served in the Army Medical Corps in World War II has recently been reviewed by Elliott Coleman of The Johns Hopkins University. Says Coleman—"The deceptively quiet lines of this *War-Diary* can suddenly shake up the reader with something of the shock of an earthquake, and then return him to a lucidity of line that will move him in another way, through grief, to a delight in humanness."

"There are the memories of curious things such as coming upon a rude kind of improvised oven in New Guinea in which a Japanese officer had cremated the body of a friend so he could send his ashes home." (Coleman). Dr. Moore states it this way—"The submarine carried a small earthenware casket containing the ashes of the man who was slain in battle; it was done so that his spirit might return home."

Another:

"He gave his love to an unfeeling machine. Bluntly put, it actually amounted to that; He slaved and worshipped the thing although He did not realize it and thought it was patriotism."

The 44 page book has been published by Contemporary Poetry, Baltimore. Price \$3.00.

#### WHO MONOGRAPH

*Yellow Fever Vaccination*, a 238-page book, has recently been published by the World Health Organization as Monograph No. 30. This book is published in English although a French edition is being prepared.

Immunology is discussed by Kenneth C. Smithburn of the Rockefeller Foundation. The discussion covers active and passive immunization.

The Dakar Vaccine is dealt with by C. Durieux and R. Koerber of the Pasteur Institute, Dakar (French West Africa).

17-D Vaccine is handled by Drs. Penna, Dick, and Courtois. Mass Vaccination in Africa and Brazil is the subject matter of Durieux and Manso. The area of Post Vaccination is extensively discussed by Dr. George Stuart, former Secretary, Yellow Fever Panel, World Health Organization.

The International Regulations and the bibliography complete the book, which is available from the Columbia University Press, International Documents Service, 2960 Broadway, New York 27, N.Y. Price is \$5.00.

#### ACCIDENTS

Over a period of several years Dow Chemical Company has kept a record of the accidental deaths of its employees. During this time three persons were killed at work (in one of the most hazardous occupations); 19 were killed in auto accidents.

#### ACCIDENTAL POISONING IN CHILDREN

The A.M.A. Committee on Toxicology recently reported that more and more children die from accidental poisoning in the United States. Approximately ten per cent of the accidental deaths in childhood are caused by the ingestion of poisonous substances, of which a third are drugs or medicaments. Some of the drug poisoning in small children is a result of overdosing, but a great deal of it is to be blamed upon the carelessness of parents who leave the drugs within easy reach for the curious child.

The Committee suggests four methods to cut down the number of accidental deaths from poisoning: 1) education of laymen and

parents, 2) more stringent federal laws about the labeling of medicaments, 3) establishment of centers for treatment of poisoning, 4) and the physician's efforts to enlighten the community about the problems of poisoning.

Because of the large number of children who are dependent upon the Medical Services of the Armed Forces there is reproduced elsewhere in this journal some rules to follow under the heading *Protect Your Family Against Poisoning*. It is felt that station surgeons may want to reproduce this chart for local distribution.

## Honor Roll

Since the publication of our last list, the following sponsored one or more applicants for membership in the Association:

Major Evelyn M. Bedard, USAF (NC)  
Col. Robert E. Bitner, USA, Ret.  
Col. Raymond Bunshaw, MC, USA  
Major George A. Burges, MC, USAR  
Major Ferris E. Cook, USAF (MC)  
Lewis L. Coriell, M.D.  
Col. Luis J. Iglesias de la Torre  
1st. Lt. Sheldon L. Freud, USAF (MSC)  
Maj. Gen. Alvin L. Gorby, MC, USA  
Col. Homan Leach, MC, USA  
Cdr. William T. Lineberry, MC, USN  
LCdr. Robert W. Northup, DC, USNR  
Major Alipio Pernet  
Col. George Prazek, MC  
Lt. Col. James R. Skillen, DC, USA  
Dr. Alexander Sosnovsky  
Dr. N. H. Wallace  
Col. Floyd L. Wergeland, MC, USA  
Dr. Merton C. Wilson  
Major Joseph B. Zeller, DC, USAR



## ALASKA DENTAL MEETING



U. S. Air Force Photo

This group who attended the first Elmendorf Dental Clinic Day, at Elmendorf Air Force Base, Alaska, is composed of representatives from that base, Ladd and Eielson Air Force Bases, Ft. Richardson Dental Clinic, the Anchorage Native Service Hospital, and the Anchorage Dental Society. A similar meeting was planned as an annual event.

## Protect Your Family Against Poisoning\*

Keep all drugs, poisons, and other household chemicals out of the reach of children and away from food.

*Lock up all dangerous substances.*

*Do not store poisonous or inflammable substances (kerosene, gasoline, rat poisons, etc.) in food or beverage containers.*

*Read all labels and carefully follow "caution" statements. Even if a chemical is not labeled "poison," incorrect use may be dangerous.*

Do not eat or serve foods which *smell or look abnormal* and remember that they may poison household and farm animals.

*Be sure all poisons are clearly marked.* This can be done by sealing with adhesive tape or using a special marker.

*When you throw away drugs or hazardous materials* be sure the contents cannot be reached by children or pets.

Warn small children not to eat or drink drugs, chemicals, plants, or berries they find, without your permission. Insist on this.

Use cleaning fluids with *adequate ventilation* only, and avoid breathing vapors.

*Protect your skin and eyes* when using insect poisons, weed killers, solvents, and cleaning agents. Be sure to wash thoroughly after use of such things, and promptly remove contaminated clothing.

Do not allow *food or food utensils* to become *contaminated* when using insect sprays, aerosol mists, rat poisons, weed killers, or cleaning agents.

\* Department of Health, Education, and Welfare, Food and Drug Administration, Division of Medicine.

*Do not take or give medicine in the dark.* Be sure you can clearly read the label on the container.

When measuring drugs give it your full attention.

Give infants and young children drugs only as directed by your physician.

Before measuring liquid medicine always shake the bottle thoroughly.

Safeguard tablets which are candied, flavored, or colored, since children eat them like candy.

Do not take medicine from an *unlabeled bottle*—transparent tape over the label will protect it.

*Date all drug supplies* when you buy them.

*Weed out the left-overs regularly* from your medicine chest—especially any prescription drug that your physician ordered for a particular illness.

Use a *prescription drug* only for the patient for whom the physician ordered it.

Read all directions and caution statements on the drug label each time you plan to use it.

Keep this where you will see it often . . . on the inside of the medicine cabinet door . . . on your kitchen or bathroom wall.

In the event of an accident immediately call a physician:

(Name)

(Telephone)

or nearest hospital

(Telephone)

## O B I T U A R I E S

### **Lt. Cdr. Jervace Letha Crouse, (NC) U. S. Navy**

Jervace Letha Crouse, Lieutenant Commander, (NC) U. S. Navy, died at the U. S. Naval Hospital, Bethesda, Maryland, January 17, 1956, at the age of 55.

Commander Crouse was a native of Ohio and graduated in 1927 from the St. Luke's Hospital School of Nursing, Cleveland, Ohio. She was appointed a Nurse in the Naval Reserve Corps in 1938; ordered to active duty in January 1942, and commissioned in the Regular Navy in 1947. Commander Crouse was a member of the Association of Military Surgeons of the United States.

### **Col. Samuel E. Brown, USAF, Ret.**

Samuel E. Brown, Colonel, U. S. Air Force, Retired, died at San Antonio, Texas,

January 29 at the age of 73.

Colonel Brown was born in South Carolina May 23, 1882. He received his medical degree from the University of Virginia in 1905. During World War I he entered the Army Medical Corps Reserves on an active duty status, and later was commissioned in the Regular Army, serving until his retirement in 1946.

He was one of the early Flight Surgeons, having graduated from the School for Flight Surgeons in 1919. Much of his military service was with the Air Corps section of the Army, and considerable time was spent at California stations, particularly March Field. He was transferred to the Air Force Retired rolls when that service became an independent one. After retirement he lived in Riverside, California, until 1950 when he chose San Antonio, Texas, as his home.

He is survived by his wife, whose address is the Menger Hotel, San Antonio, Texas.





## BOOK REVIEWS

**RHEUMATOID ARTHRITIS AND PSORIASIS VULGARIS.** Internal and Cutaneous Manifestations of the Permanent Endoparasitism in the *Homo Sapiens*. Their Common Etiology, Pathogenesis, and Specific Vaccine Therapy. By Tibor Benedek, M.D., Assistant Clinical Professor of Dermatology and Syphilology, Stritch School of Medicine, Loyola University. Editor Mycopathologia and Mycologia Applicata. Member Chicago Rheumatism Society, American Rheumatism Association, Society of Illinois Bacteriologists. 308 pages, several illustrations, Litho-printed, Edwards Brothers, Inc., Ann Arbor, Michigan, 1955. Distributed through Chicago Medical Book Co.

In this monograph the author proposes and presents argument that pompholyx, pityriasis rosea, hidradenitis suppurativa, seborrheic dermatitis, sycosis vulgaris, as well as psoriasis vulgaris and rheumatoid arthritis, of both peripheral and spinal types, are caused by a single etiologic organism, the *Bacillus endoparasiticus* Benedek, 1927.

This organism was first discovered by Max Schüller in 1892 when he isolated a "dumb bell" shaped bacillus from synovial fluid of patients afflicted with rheumatoid arthritis. Although Bannatyne, Wohlmann, and Blaxall duplicated this finding in England in 1896 and Rhodes Fayerweather in this country found the same organism in 1905, their reports, like Schüller's original publication, were forgotten. Benedek independently rediscovered this agent in 1925 and gave a detailed description of it in 1927.

The author claims unique characteristics for this microbe. It is a gram negative rod, with biterminal spores with a central constriction, that is a permanent endoparasite of man and man only. It occurs in three forms: an S (smooth) type found in the blood; an O (intermediate or mucoid) type present in the skin; and an R (rough) type derived from both of them. The R type is non-pathogenic, but dissociation of S to R types and *vice-versa* may occur *in vivo* as well as *in vitro*. Others have labelled these organisms *B. subtilis* (R type), *B. megatherium* (O type), and *B. cereus* (S type). The

organisms can be isolated and grow readily on media devised by the author.

The endoparasite causes these various diseases in certain individuals through an allergic reaction that occurs in the mesenchymal tissue adjacent to the corium or synovia, and these diseases can only be influenced by factors which affect the organism itself or the reactant tissue sites or both.

In active rheumatoid arthritis and psoriasis the patient is afflicted with a bacteremia of the S type. The author recovers the organism by causing a blister to form upon the skin by application of a cantharides preparation. The endoparasite abounds in the vesicular fluid and can be demonstrated readily by Weigert's carmine stain and grown on culture media.

In the pregnant woman with rheumatoid arthritis, the endoparasite enters the fetus through the placenta and becomes modified by fetal tissue. Re-entering the maternal circulation as a modified strain, it "desensitizes" the expectant mother to her original endoparasitic strain and thus Benedek explains the remission of rheumatoid arthritis by pregnancy. Jaundice and hepatotoxic agents, such as gold and cinchophen, increase the amount of bile salts in the circulation and these have an adverse effect upon the endoparasite. ACTH and the steroids affect the receptor sites by inhibition of their allergic reaction to the endoparasite, but, since the latter is unaffected, the clinical state will relapse whenever this form of therapy is discontinued. Because the organism is a spore former, there can be no hope that antibiotics will eradicate the permanent endoparasite and Benedek claims that such therapy may disturb a beneficial relationship between the S and R varieties and thereby cause serious harm to the patient.

The one and only specific therapy for rheumatoid arthritis and psoriasis (the other diseases are essentially self-limiting) is to simulate the situation that occurs in the pregnant woman by introducing a vaccine of a heterogeneous strain of the organism endermally or subcutaneously. These injections are given on a weekly or twice weekly scheme in 0.1 ml amounts of various dilu-

tions of the vaccine. The author claims gratifying results.

Doctor Benedek is well versed in immunology, dermatology and rheumatology. He is most familiar with the literature on these subjects, and he not only refers liberally to publications of others but concludes each chapter with an extensive bibliography that includes both European and American articles.

He is certainly sincere, but it just seems impossible that since 1927 he and he alone would know and follow the only logical road to therapeutic triumph over such resistant diseases as psoriasis and rheumatoid arthritis. It is hoped that others will check the author's claims for should he be right, then we have the means to arrest not only pompholyx, pityriasis rosea, sycosis vulgaris, psoriasis and rheumatoid arthritis, but dandruff too.

CAPT. JULIAN LOVE, MC, USN

OFFICE PROCEDURES. By Paul Williamson, M.D. 412 pages, illustrated. W. B. Saunders Company, Philadelphia and London. 1955. Price \$12.50.

This physically attractive, well-organized manual covers the specialties of ENT, Eye Orthopedics, Gynecology, Obstetrics, Urology, Proctology, Minor Surgery, Internal Medicine, Pediatrics, Psychological Testing, Anesthesiology, Physiotherapy, Laboratory and X-Ray, presumably for the guidance of the general practitioner, though an all too brief preface does not so state.

Specialties are covered concisely, yet much valuable and instructive material is presented. Illustrations are excellent; explanatory "how-to-do-it" text is simple and forceful. Commendable use is made of inexpensive, always-available materials, e.g. paper-clips, tire-treads, wire coathangers.

However, numerous dubious procedures are presented, some carrying the potential of serious danger or disability. Certain "office procedures" described are ordinarily undertaken even by trained specialists with some trepidation. One would require exceptional skill, discrimination, and assistance, not available to most practitioners, to perform many of the described procedures even under hospital conditions. This manual will require careful "pruning" to make it a safe guide for the average physician.

LT. COL. L. S. AYARS, USAF (MC)

THE BIOLOGIC EFFECTS OF TOBACCO, With Emphasis on the Clinical and Experimental Aspects. Edited by Ernest L. Wyn-

der, M.D. 215 pages. Little, Brown and Company, Boston. 1955. Price \$4.50.

"To smoke or not to smoke has become one of the burning issues of the day" opens this critical, authoritative discussion of this controversial question. Dr. Wynder has obtained the aid of seven other experts in the preparation of a summary of present fact, as distinguished from fancy, regarding the possible relationship to the use of tobacco to human health. Both sides of the controversy are summarized, and the need for additional, scientifically controlled investigations in practically every aspect of the field are stressed. After studying this information, the conclusion appears warranted that any attempt to introduce tobacco, more particularly cigarettes at the present time, would meet with a great deal of opposition from public health considerations. The calculated risks become obvious from consideration of the evidence as presented; however, such phases do not overcome personal desires.

This treatise is divided into seven chapters, supplemented by a foreword, and by author and subject indices. Chapter one stresses the variable composition of tobacco smoke, which contains particulates ranging in size from 0.3 to 1 micron as formed, but rapidly increasing in size, with the estimate that half of them would be retained in the lungs and bronchi of a smoker. Combustion of tobacco, cigarette paper and various additives produces well over a hundred different chemical products, in varying ratios; therefore, the value of filters on composition appears remote. The metabolism of nicotine is presented; its rapid absorption and elimination; excitatory and paralyzing effects on various systems depending on the dosage and other pharmacological responses are noted. The heart rate is accelerated and the blood pressure increased; atheromatous lesions and arteriosclerosis have been produced in animals chronically treated with convulsant doses. Reducing nicotine content 90% did not decrease smoking pleasure significantly.

Clinical evidence shows a definite decrease in surface temperature at the fingertips of about 6° C after smoking a cigarette; this appears to be linked to the development of TAO (Thromboangiitis obliterans), even after sympathectomy. Neither filters nor denicotinization have eliminated these deleterious effects. On the other hand, there is no evidence that tobacco plays a part in the production of arteriosclerosis, coronary artery disease or hypertension but its use unfavorably influences their clinical force.

Cigarette smoking plays an important role

in causing lung cancer, even though other factors may also be associated. It increases the risk of development of cancer of the larynx, tongue, and oral cavity; it has not been shown to be associated with the development of other types of cancer. Few studies have considered the effect on the gastrointestinal tract; there is no evidence that the use of tobacco produces organic disturbances but clinical data show functional disturbances following the use of tobacco. So far as allergy is concerned, difficulties have arisen because of the presence of other products in tobacco as smoked. Dermatitis or asthma may follow exposure to tobacco or tobacco smoke, perhaps from irritation rather than allergy. About one third of the smoking population has skin sensitivity to tobacco. Finally, this book closes with a discussion of the statistical approach to any epidemiological research and the determination of association vs. causation. For example, Pott showed that cancer of the scrotum, a very rare disease, was increased in frequency among chimney sweeps; about 150 years were required to demonstrate the causal factor and to consistently reproduce the condition.

This is an intriguing book, scientifically prepared to inform readers of both sides of the controversy on tobacco. To be informed, one should read it; then smoke or not as any individual decides to work out the calculated risk.

JAMES C. MUNCH

**REHABILITATION OF A CHILD'S EYES.** 2nd Ed. By R. G. Scobee, M.D., F.A.C.S., Late Ass't Prof. of Ophthalmology, Washington University; and H. M. Katzin, M.D., F.A.C.S., Associate Surgeon, Manhattan Eye, Ear and Throat Hospital. 133 pages, illustrated. The C. V. Mosby Company, St. Louis. 1955. Price \$2.85.

This book was originally written under the title of "A Child's Eyes" by Dr. Richard Scobee in 1949. It was written primarily to answer the questions of parents who had a child with strabismus and to educate the parents to better cooperation with the oculist. It served to save the oculist a great amount of office time and gave the parents an insight into the problem with resulting benefit to the child.

Dr. Herbert M. Katzin has revised the book under the above title. He has preserved the original purpose and much of the book is in Dr. Scobee's own words. The revised edition gives very well the proper procedure to be followed in managing the child with strabismus.

Rectal anaesthesia with sodium pentothal in the room with the parents before going to surgery is advocated, sparing the child much emotional disturbance. Abnormal retinal correspondence is explained in a slightly different manner. Reading problems and strabismus are discussed. Consideration is given to the psychological effect of wearing a patch to eliminate amblyopia by forming a "Patch Club" or "Captain Kidd Club." More description of the actual surgery is given enabling the parent to better understand the problems. A glossary has been added.

This book is well worth the small cost, will save the oculist much time and will secure much better cooperation from the parents.

LESTER H. QUINN, M.D.

**THERAPY OF FUNGUS DISEASES—INTERNATIONAL SYMPOSIUM.** Edited by Thomas H. Sternberg, M.D., Professor of Medicine (Dermatology) and Victor D. Newcomer, M.D., Associate Professor of Medicine (Dermatology), University of California at Los Angeles. 337 pages. Little Brown and Company, Boston and Toronto. 1955. Price \$7.50.

This is a compilation of scientific papers on Fungus Diseases, presented at an International Symposium held under the auspices of the Dept. of Dermatology, Dept. of Medicine, U.C.L.A., in June 1955. More than 200 scientists representing 24 states and 8 foreign countries participated in this noteworthy symposium which was made possible by the financial assistance of the Squibb Institute for Medical Research. Most of the papers are condensed and deal with the many problems concerning fungus diseases, especially those with reference to therapy. Included are reports dealing with animal and laboratory research; investigative work on human patients; treatment with antibiotics, antihistamines, hormones, sulfur and other antifungal agents. Several papers elaborate on the investigative work with, and the beneficial results obtained from, nystatin (mycostatin) a promising new antifungal antibiotic. Scientists from India, France, Argentina, Brazil, Mexico, the Ukraine and the Philippines contribute interesting data on fungus problems in their countries. Those desiring up to date information on the many aspects of fungus diseases will find this an excellent reference.

COL. H. P. MARVIN, USA, RET.

**THE TREATMENT OF RENAL FAILURE.** Therapeutic Principles in the Management of Acute and Chronic Uremia. By John P. Merrill, M.D., Associate in Medicine,

## NEW BOOKS

- Yellow Fever Vaccination*, by Smithburn et al. World Health Organization, Palais des Nations, Geneva. Price cloth \$5.00.
- Obstetric Practice*, by Harold Speert, M.D. and Alan F. Guttmacher, M.D. McGraw-Hill Book Co., New York, N.Y. Price \$7.00.
- State Control of Milk Prices. A Factual Study of Legal Aspects*, by James A. Tobey, Dr. PH., LL.D. Milk Industry Foundation, Washington, D.C. Price \$6.00.
- The Officer's Guide*, 22nd ed. A Ready Reference on Customs and Correct Procedures which pertain to commissioned officers of the U. S. Army. The Military Service Publishing Co., Harrisburg, Pa. Price \$5.00.
- So You're Going in the Army*, by Capt. John L. Begley. The Military Service Publishing Co., Harrisburg, Pa. Price \$1.95.
- Operative Technic in Specialty Surgery*, 2nd ed., edited by Warren H. Cole, M.D., F.A.C.S., Appleton-Century-Croft, Inc., New York, N.Y. Price \$20.00.
- Laboratory Manual for Microbiology*, 2nd ed., by Catherine Jones Witton. Blakiston Div., McGraw-Hill Book Co., Inc., New York, N.Y. Price \$2.50.
- Urology*, by B. G. Clarke, M.S., M.D., F.A.C.S. and Louis R. M. Del Guercio, M.D. Blakiston Div., McGraw-Hill Book Co., Inc., New York, N.Y. Price \$6.50.
- Welcome Aboard, A Service Manual for the Naval Officer's Wife*, by Florence Ridgley Johnson. U. S. Naval Institute, Annapolis, Md. Price \$3.50.
- Doctor and Patient and the Law*, by Louis J. Regan, M.D., LL.B. The C. V. Mosby Co., St. Louis, Mo. Price \$12.50.
- Military Justice in the Armed Forces of the United States*, by Robinson O. Everett. Military Service Publishing Co., Harrisburg, Pa. Price \$5.00.
- The Neuroses in Clinical Practice*, by Henry P. Laughlin, M.D., W. B. Saunders Co. Philadelphia, Pa. Price \$12.00.
- Precis d'Epidemiologie et Prophylaxie des Grandes Endemies Tropicales*, by V. Reynes. Masson et Cie, Editeurs, 120 Blvd. Saint-Germain, Paris, France. Price 2.800 Fr.
- 1956 Medical Progress, A Review of Medical Advances During 1955*, Morris Fishbein, M.D. Editor. The Blakiston Division, McGraw-Hill Book Co., Inc., New York, N.Y. Price \$5.50.

Any of the above books may be ordered through the Association of Military Surgeons. Check book desired and return this page.



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